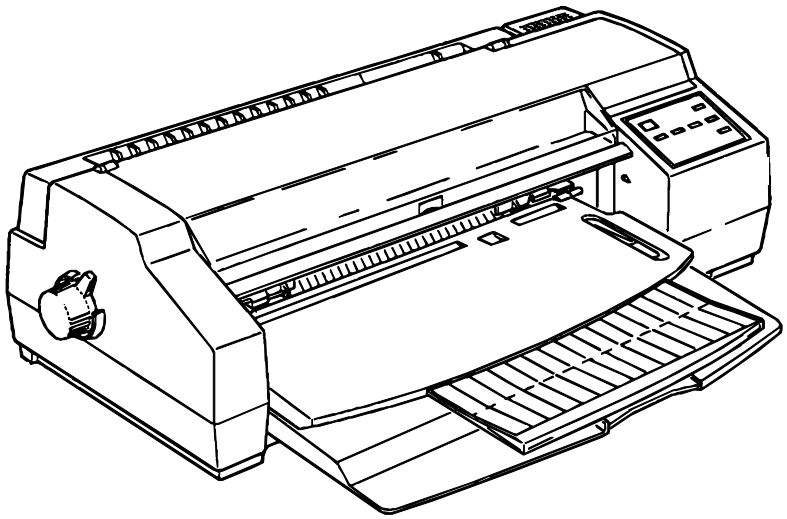
EPSON

COLOR INK JET PRINTER

EPSON Stylus COLOR 1520

SERVICE MANUAL



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PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1) personal injury and 2) damage to equipment.

WARNING Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by WARNING Headings.

CAUTION Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/maintenance procedures.

WARNING

1. ALWAYS DISCONNECT THE PRODUCT FROM BOTH THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.
2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL. DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

CAUTION

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGE IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of Stylus COLOR 1520.

The instructions and procedures included herein are intended for the experience repair technician, and attention should be given to die precautions on the preceding page. The Chapters are organized as follows:

CHAPTER 1. GENERAL DESCRIPTION

Provides a general product overview, lists specifications, and illustrates the main components of the printer.

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of printer operation.

CHAPTER 3. DISASSEMBLY AND ASSEMBLY

Includes a step-by-step guide for product disassembly and assembly.

CHAPTER 4. ADJUSTMENT

Includes a step-by-step guide for adjustment.

CHAPTER 5. TROUBLESHOOTING

Provides EPSON-approved techniques for troubleshooting.

CHAPTER 6. MAINTENANCE

Describes preventive maintenance techniques and lists lubricants and adhesives required to service the equipment.

APPENDIX

Describes connector pin assignments, circuit diagrams, circuit board component layout and exploded diagram.

The contents of this manual are subject to change without notice.

REVISION SHEET

Revision	Issued Data	Contents
Rev. A	FEBRUARY 25 1997	First issue
Rev. B	MARCH 3 1997	Second issue for Chapter 1
Rev. C	November 28, 1997	Addition of “4.1.9 Uni-D Adjustment”

TABLE OF CONTENTS

CHAPTER 1.	**GENERAL DESCRIPTION**
CHAPTER 2.	**OPERATING PRINCIPLES**
CHAPTER 3.	**DISASSEMBLY AND ASSEMBLY**
CHAPTER 4.	**ADJUSTMENT**
CHAPTER 5.	**TROUBLESHOOTING**
CHAPTER 6.	**MAINTENANCE**
APPENDIX	

Chapter 1
Product Description

1.1 Features 1-1

1.2 Specification 1-3

1.2.1 Printing Specifications 1-3

1.2.2 Control codes 1-4

1.2.3 Character tables 1-4

1.2.4 Paper Feeding 1-5

1.2.5 Paper Specification 1-6

1.2.5.1 Cut Sheet 1-6
1.2.5.2 Transparency 1-6
1.2.5.3 Envelope 1-6
1.2.5.4 Index Card 1-6
1.2.5.5 Labels (Cut Sheet) 1-7
1.2.5.6 Continuous Paper 1-7
1.2.5.7 Labels (Continuous) 1-7
1.2.5.8 Banner 1-7

1.2.6 Printable Area 1-8

1.2.7 Adjust Lever 1-11

1.2.8 Ink Specification 1-12

1.2.8.1 Black ink cartridge 1-12
1.2.8.2 Color ink cartridge 1-12

1.2.9 Input Data Buffer 1-12

1.2.10 Electric Specifications 1-13

1.2.11 Environmental Conditions 1-13

1.2.12 Reliability 1-14

1.2.13 Safety Approvals 1-14

1.2.14 CE Marking 1-14

1.2.15 Acoustic Noise 1-14

1.3 Interfaces 1-15

1.3.1 Parallel Interface 1-15

1.3.1.1 Forward Channel Specifications 1-15
1.3.1.2 Reverse Channel Specifications 1-17

1.3.2 Mac Serial Interface 1-18

1.3.2.1 Serial Interface Specifications 1-18

1.3.3 Optional Interface 1-19

1.3.4 Prevention Hosts from Data Transfer Time-out 1-20

1.3.5 Interface Selection 1-20

1.3.6 Printer language and Control Codes 1-20

1.4 Operation 1-21

1.4.1 Control Panel 1-21

1.4.2 Panel Functions at Power On 1-23

1.4.3 Printer Condition and Panel Status 1-24

1.4.4 Cover Open Sensor Operation 1-25

1.4.5 Default Setting 1-25

1.4.5.1 Setting Method 1-25
1.4.5.2 Setting Menus 1-27

1.4.6 Printer Adjustment Mode 1-29

1.4.6.1 Adjustment Method 1-29

1.4.6.2 Adjustment patterns....1-29
1.4.7 Printer Initialization....1-30
1.4.8 Self-test Printing Mode....1-30
1.4.9 Hexadecimal Dump Function....1-30
1.4.10 Monochrome Printing Mode....1-30
1.5 Physical Specification....1-31
1.6 Main Components....1-32
1.6.1 C211 MAIN Board....1-32
1.6.2 C172 PSB/PSE Board....1-33

1.1 Features

The EPSON Stylus COLOR 1520 is a business-use, high speed, and high-quality color ink jet printer. The main features of this printer are:

- High Speed Printing
  - 400 cps for LQ mode
  - 800 cps for draft mode
- High print quality for color graphics
  - High Resolution :1440 (H) X 720 (V) dpi printing
  - Colors :Cyan, Magenta, Yellow, Black
  - Printing Method :Traditional and new micro weave printing
  - Smaller dot diameter for image improvement
- Built-in auto sheet feeder with a wide availability and high capacity
  - This printer holds :Envelope up to A2 size portrait
    :100 cut sheets (55 g/‡u)
    :10 envelopes
    :50 transparency films
    :70 special paper
- Built-in 2 interfaces and 1 optional interface card
  - Mac serial interface (up to approximately 900 kbps)
  - Bi-directional parallel interface (IEEE1284 level 1 device)
  - Optional Type-B interface card
- 4 scalable fonts and 5 LQ fonts
  - Scalable fonts :Roman T, Sans Serif H, Roman, Sans Serif
  - LQ fonts :Roman, Sans Serif, Courier, Prestige, Script
  - Useful character tables :Italic, PC437, PC850, PC860, PC861, PC863, PC865, BRASCII, Abicomp, Roman 8, ISO Latin 1
    PC437 Greek, PC852, PC853, PC855, PC857, PC866, PC869, MOZOAWIA, Code MJK, ISO 8559-7, Latin 1T, Bulgaria, PC774, Estonia, ISO 8859-2, PC866 LAT

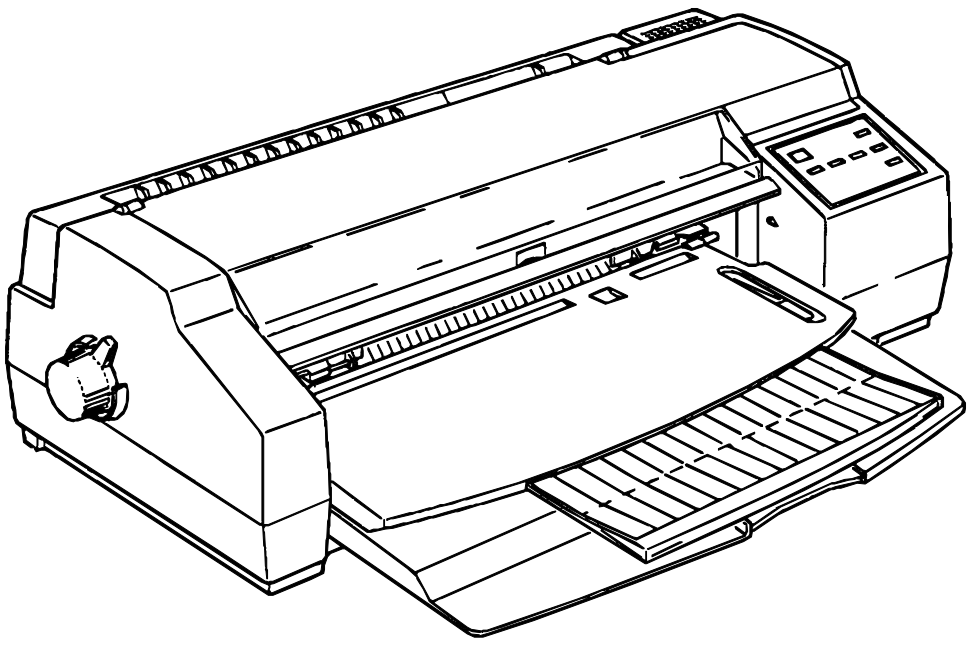


Figure 1-1. Exterior View of the EPSON Stylus COLOR 1520

Table 1-1. Options and Consumables

Model	Description
C82305∗/C82306∗	Serial interface card
C82307∗/C82308∗	32 KB serial interface card
C82310∗	32 KB parallel interface card
C82313∗	32 KB EEE-488 interface card
C82315∗	Twinax interface card
C82314∗	Coax interface card
C82312∗	LocalTalk™ interface card
C82331∗	Ethernet interface card
C82345∗	Type-B Bidirectional parallel interface card
C83602∗	Parallel interface cable (shielded) from D-SUB 25-pin (computer) to Amphenol 57 (printer)
C83603∗/C83604∗	Serial interface cable from D-SUB 25-pin (computer) to D-SUB 25-pin (printer)
C83605∗/C83606∗	Serial interface cable from D-SUB 9-pin (computer) to D-SUB 25-pin (printer)
C811**∗	Banner paper holder and cutting guide
S020108	Black ink cartridge
S020089	Color ink cartridge
S041059 / S041025	EPSON 360 dpi ink jet paper (A4)
S041060	EPSON 360 dpi ink jet paper (Letter)
S041065	EPSON 360 dpi ink jet paper (A3)
S041066	EPSON 360 dpi ink jet paper (Super A3/B)
S041061 / S041026	EPSON photo quality ink jet paper (A4)
S041062	EPSON photo quality ink jet paper (Letter)
S041067	EPSON photo quality ink jet paper (Legal)
S041068	EPSON photo quality ink jet paper (A3)
S041070	EPSON photo quality ink jet paper (B)
S041069	EPSON photo quality ink jet paper (Super A3/B)
S041054	EPSON photo quality ink jet card (A6)
S041121	EPSON photo quality ink jet card (5 X 8 inch)
S041122	EPSON photo quality ink jet card (8 X10 inch)
S041071	EPSON photo quality glossy film (A4)
S041072	EPSON photo quality glossy film (Letter)
S041107	EPSON photo quality glossy film (A6)
S041073	EPSON photo quality glossy film (A3)
S041075	EPSON photo quality glossy film (B)
S041074	EPSON photo quality glossy film (Super A3/B)
S041126	EPSON photo quality glossy paper (A4)
S041124	EPSON photo quality glossy paper (Letter)
S041125	EPSON photo quality glossy paper (A3)
S041123	EPSON photo quality glossy paper (A2)
S041063	EPSON ink jet transparencies (A4)
S041064	EPSON ink jet transparencies (Letter)
S041106	EPSON photo quality self adhesive sheet (A4)
S041103	EPSON 360 dpi ink jet banner paper
S041102	EPSON photo quality banner paper
S041***	EPSON ink jet canvas
S041***	EPSON back light film (A3)
S041***	EPSON back light film (A2)

Note) The asterisk is a substitute for the last digit of the product number, which varies by country.

1.2 Specification

This section provides detailed information on the EPSON Stylus COLOR 1520.

1.2.1 Printing Specifications

- ❑ Printing method :On demand Ink jet
- ❑ Nozzle configuration :Monochrome 128 nozzles (32 x 4 staggered)
  :Color 64 nozzles each (magenta, cyan, yellow)

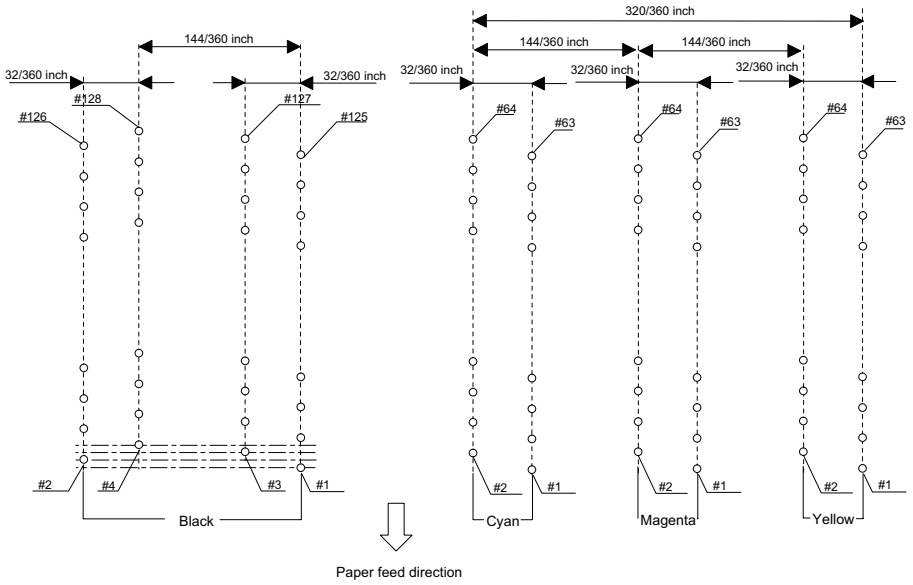


Figure 1-2. Nozzle Configuration

- ❑ Printing direction :Bi-directional with logic-seeking
- ❑ Printing speed and Printable columns

Table 1-2. Print Speed and Printable Columns for Character Mode

Character Pitch	Printable Columns	LQ Speed	Draft Speed
10 cpi (Pica)	136	400 cps	800 cps
12 cpi (Elite)	163	480 cps	960 cps
15 cpi	204	600 cps	1200 cps
17.1 cpi(Pica condensed)	233	684 cps	1378 cps
20 cpi(Elite dondensed)	272	800 cps	1600 cps

Table 1-3. Print Speed and Printable Columns for Raster Graphic Mode

Print Mode	Printable Area	Available Dot	CR Speed
180 dpi X 180 dpi	11 inch	1980	40 ips
360 dpi X 360 dpi	11 inch	3960	20 ips
720 dpi X 720 dpi	11 inch	7920	20 ips
1440 dpi X 1440 dpi *[1]	11 inch	7920 *[2]	10 ips

Note) 1: 1440 dpi X 720 dpi is available when using driver micro weave only.
2: 1440 dpi X 720 dpi can be printed by sending Following command sequence.
1. Set the print speed to 10 IPS.
2. Print 180 X 720 raster image.
3. Paper feed 31/720 inch.
4. Move 1/1440 inch print position.
5. Print 180 X 720 raster image.
6. Paper feed 31/720 inch.
Repeat the steps from 2 to 6.

1.2.2 Control codes

ESCP/2 and expanded raster graphics code
EPSON Remote command
IBMX24E emulation

1.2.3 Character tables

- Legal and 14 international character sets
  - Standard version: 27 character tables

Italic table	PC 437 (US, Standard Europe)
PC 850 (Multilingual)	PC 860 (Portuguese)
PC 861 (IceLandic)	PC 863 (Canadian-French)
PC 865 (Nordic)	Abicomp
BRASCII	Roman 8
ISO Latin 1	PC 437 (Greek)
PC 852 (East Europe)	PC 853 (Turkish)
PC 855 (Cyrillic)	PC 857 (Turkish)
PC 866 (Russian)	PC 869 (Greek)
MOZOAWIA (Poland)	Code MJK (CSFR)
ISO 8559-7 (Latin, Greek)	ISO Latin 1T (Turkish)
Bulgaria (Bulgaria)	PC 774
Estonia	ISO 8859-2 (ISO Latin 2)
PC 866 LAT	

- Typeface
  - Bit map LQ font

EPSON Roman	10 cpi, 12 cpi, 15 cpi, Proportional
EPSON Sans Serif	10 cpi, 12 cpi, 15 cpi, Proportional
EPSON Courier	10 cpi, 12 cpi, 15 cpi,
EPSON Prestige	10 cpi, 12 cpi, 15 cpi,
EPSON Prestige	10 cpi, 12 cpi, 15 cpi

  - Scalable font

EPSON Roman	10.5 pt., 8 pt. – 32 pt. (every 2 pt.)
EPSON Sans Serif	10.5 pt., 8 pt. – 32 pt. (every 2 pt.)
EPSON Courier	10.5 pt., 8 pt. – 32 pt. (every 2 pt.)
EPSON Prestige	10.5 pt., 8 pt. – 32 pt. (every 2 pt.)
EPSON Script	10.5 pt., 8 pt. – 32 pt. (every 2 pt.)

Note) Each typeface has 4 variations:
Normal, Bold, Italic, and Bold Italic
An example of variations for Epson Roman is as follows:
Epson Roman normal
Epsom Roman bold
Epson Roman italic
Epson Roman bold italic

- Combinations of Character tables and typefaces (font)
  Table 1-14 shows the available combinations of character tables and Typefaces.

Table 1-4. Character Tables and Fonts

Character Tables	Bitmap Fonts	Scalable Fonts	Scalable Fonts
	EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script	EPSON Roman EPSON Sans Serif	EPSON Roman T EPSON Sans Serif H
Italic PC 860 (Portuguese)) PC 861 (IceLandic) PC 863 (Canadian-French) PC 865 (Nordic) BRASCII Abicomp Roman 8 ISO Latin 1	Supported	Supported	Supported
Italic table PC 437 (US Standard Europe) PC 850 (Multilingual) PC 437 (Greek) PC 852 (East Europe) PC 853 (Turkish) PC 855 (Cyrillic) PC 857 (Turkish) PC 866 (Russian) PC 869 (Greek) MAZOWIA (Poland) Code MJK (CSFR) ISO 8859-7 (Latin/Greek) ISO Latin 1T (Turkish) Bulgaria (Bulgaria) PC 774 Estonia ISO 8859-2 (ISO Latin 2) PC 866 LAT	Supported	Supported	Not Supported

1.2.4 Paper Feeding

- Paper transport method :Friction feed with built-in auto sheet feeder (ASF)
- Line spacing :1/6, 1/8 inch or programmable at 1/360 inch
- Paper path :Cut-sheet ASF (Front entry)
  :FF Rear tractor
- Feed speed :66 ms / line (1 line = 1/6 inch)
  88.9 mm / sec
  3.5 inch / sec

1.2.5 Paper Specification

1.2.5.1 Cut Sheet

Table 1-5. Cut Sheet Size

Size	Width	Length
A4	210 mm (8.3")	297 mm (11.7")
Letter	215.9 mm (8.5")	279.4 mm (11.0")
B5	182 mm (7.2")	257 mm (10.1")
Legal	215.4 mm (8.5")	355.6 mm (14.3")
B4	257 mm (10.1")	364 mm (14.0")
A3	297 mm (11.7")	420 mm (16.5")
Ledger	279.4mm (11.0")	431.8 mm (17.0")
A3 wide	329 mm (13.0")	483 mm (19.0")
A2	420 mm (16.5")	594 mm (23.4")
US-C	431.8 mm (17.0")	558.8 mm (22.0")
B5 (ISO)	176 mm (6.9")	250 mm (9.8")
B4 (ISO)	250 mm (9.8")	353 mm (13.9)"

- ❑ Paper Thickness :0.065 mm (0.0025") to 0.11 mm (0.004")
- ❑ Paper Weight :64 g/ m^2 (17 lb.) to 90 g/ m^2 (24 lb.) (ASF)
  :52 g/ m^2 (14 lb.) to 90 g/ m^2 (24 lb.) (Manual insertion)
- ❑ Quality :Exclusive paper *[2], Bond paper, PPC

Note) 1. A2 portrait and US-C portrait are used by manual insertion only.
2. Be sure to use the designated side of exclusive paper.

1.2.5.2 Transparency

Table 1-6. Transparency Size

Size	Width	Length
A4	210 mm (8.3")	297 mm (11.7")
Letter	215.9 mm (8.5")	279.4 mm (11.0")

- ❑ Paper thickness :0.075 mm (0.003") to 0.085 mm (0.0033")

Note) Transparency printing is only available at normal temperatures.
Transparency paper must be printed on the designated side.

1.2.5.3 Envelope

Table 1-7. Envelope Size

Size	Width	Length
No.10	241.3 mm (9 1/2")	104.8 mm (4 1/8")
DL	220 mm (8.7")	110 mm (4.3)
C5	229 mm (9")	162 mm (6.4)

- ❑ Paper Thickness :0.16 mm (0.006") to 0.52 mm (0.02")
- ❑ Paper Weight :45 g/m^2 (12 lb.) to 90 g/ m^2 (24 lb.)
- ❑ Quality :Bond paper, Plain paper, Air mail

Note) Envelope printing is only available at normal temperatures.
Place the longer side of the envelope horizontally when setting.

1.2.5.4 Index Card

Table 1-8. Index Card Size

Size	Width	Length
A6 index card	105 mm (4.1")	148 mm (5.82")

- ❑ Card Thickness :0.23 mm (0.0091")

1.2.5.5 Labels (Cut Sheet)

Table 1-9. Label Size

Size	Width	Length
A4	210 mm (8.3”)	297 mm (11.7”)
Letter	216 mm(8.5”)	279 mm (11.0”)

- ❑ Paper thickness :0.2 mm (0.0079”) including base sheet
- ❑ Quality :Page printer label

Note) Label must be printed at normal room temperature.

1.2.5.6 Continuous Paper

- ❑ Paper size :Paper width 101.6 mm (4”) to 406.4 mm (16”)
  :Folding length 101.6 mm (4”)
- ❑ Paper thickness :0.065 mm (0.0026”) to 0.11 mm (0.0043”)
- ❑ Paper Weight :52 g/ m^2 (14 lb.) to 82 g/ m^2 (22 lb.)

1.2.5.7 Labels (Continuous)

- ❑ Paper size
  - ▪ Base sheet :Paper width 101.6 mm (4”) to 406.4 mm (16”)
    :Folding length 101.6 mm (4”)
  - ▪ Label :Width 63.5 mm (2.5”)
    :Length 23.9 mm (0.94”)
- ❑ Paper thickness :0.2 mm (0.0079”) or less including base sheet
  :0.12 mm (0.0047”) or less without base sheet
- ❑ Quality :Plain paper

Note) Label (continuous) must be printed under normal room temperatures.

1.2.5.8 Banner

- ❑ Size :Width :210 mm (8.32) to 432 mm (17.0”)
  :Length :5.0 m or less (196.9”)
- ❑ Thickness :0.08 mm (0.0031”) to 0.1 mm (0.0039”)
- ❑ Weight :64 g/m^2 (17 lb.) to 82 g/ m^2 (22 lb.)
- ❑ Quality :Plain paper

1.2.6 Printable Area

❑ Cut Sheet

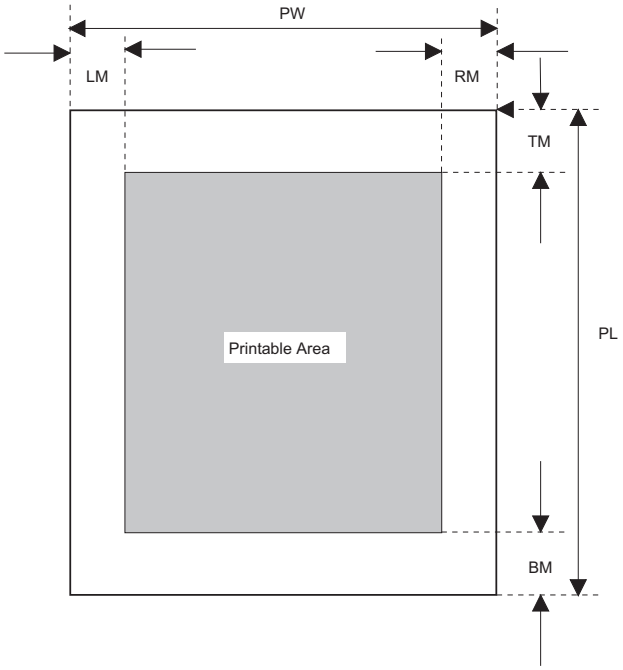


Figure 1-3. Printable Area for Cut Sheet

Table 1-10. Minimum Margins for Different Cut Sheet Sizes

PW (Paper Width)	LM (Left Margin)		RM (Right Margin)		TM (Top Margin)	BM (Bottom Margin)
	Set to right edge	Set to left edge	Set to right edge	Set to left edge		
A4 297 mm (11.87”)	3 mm (0.12”)	3 mm (0.12”)	3 mm (0.12”)	3 mm (0.12”)	3 mm (0.12”)	14 mm (0.54”)
Legal (L) 356 mm (14.0”)	3 mm (0.12”)	5 mm (0.20”)	5mm (0.20”)	3 mm (0.12”)	3 mm (0.12”)	14 mm (0.54”)
B4 (L) 364mm (14.3”)	3 mm (0.12”)	16 mm (0.51”)	16 mm (0.51”)	3 mm (0.12”)	3 mm (0.12”)	14 mm (0.54”)
A3 (L) 420 mm (16.5”)	13 mm (0.51”)	25 mm (0.98”)	62 mm (2.32”)	50 mm (1.85”)	3 mm (0.12”)	14 mm (0.54”)
Ledger (L) 432 mm (17.0”)	25 mm (0.98”)	25 mm (0.98”)	62 mm (2.32”)	62 mm (2.32”)	3 mm (0.12”)	14 mm (0.54”)

Note) 1. (L) : When the paper is placed in landscape orientation.
2. Printable are of label (cut sheet) is as same as cut sheet.

❑ Envelope

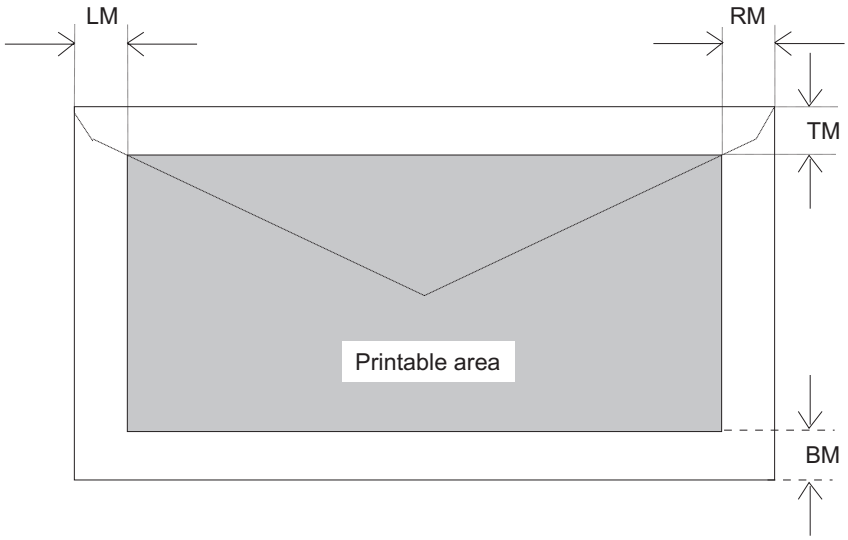


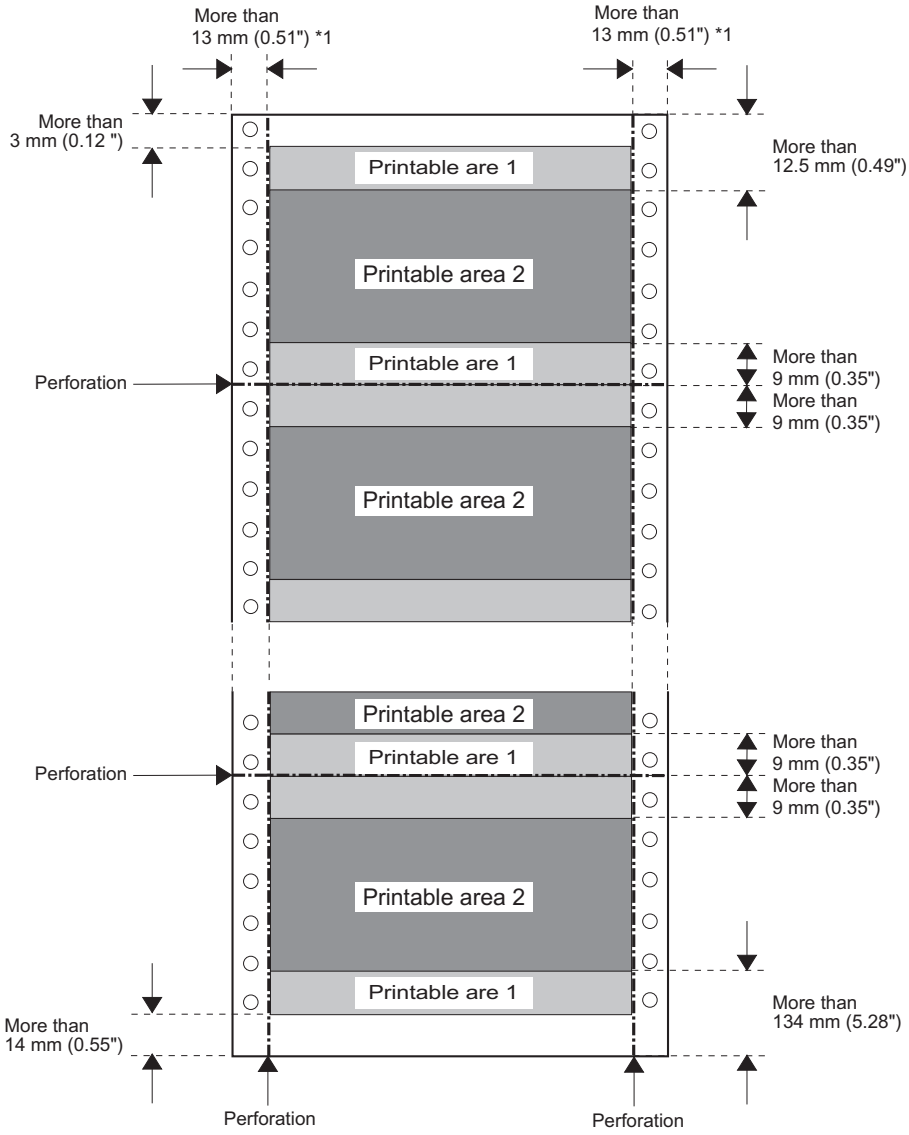
Figure 1-4. Printable Area for Envelopes

Table 1-11. Minimum Margin for Envelope

LM (Left Margin) (minimum)	RM (Right Margin) (minimum)	TM (Top Margin) (minimum)	BM (Bottom Margin) (minimum)
3 mm (0.12”)	3 mm (0.12”)	3 mm (0.12”)	14 mm (0.55”)

❑ Continuous Paper

Note) 1. Printable area of label (continuous) is as same as for continuous paper.
2. Base sheet of label (continuous) is not within the printing area.



Printable Area 1: Paper feed pitch is not guaranteed in this area.

Printable Area 2: Paper feed pitch is guaranteed in this area.

Perforation

*1 : When the paper width is more than 406.4 mm (16"), this width is more than 38 mm (1.50").

Figure 1-5. Printable Area for Continuous Paper

1.2.7 Adjust Lever

The adjust lever , located at the left and upper side of the printer , is used to adjust the gap between the paper and platen. The adjust lever must be set to the proper position the paper type in order to prevent the paper from smudging.

Table 1-12. Adjust Lever Position

Paper Type	Lever Position	Platen Gap Adjustment Value
Cut sheet Transparency Continuous paper Index card	Far side (0)	0 mm
Envelopes	Near side (+)	+ 0.7 mm

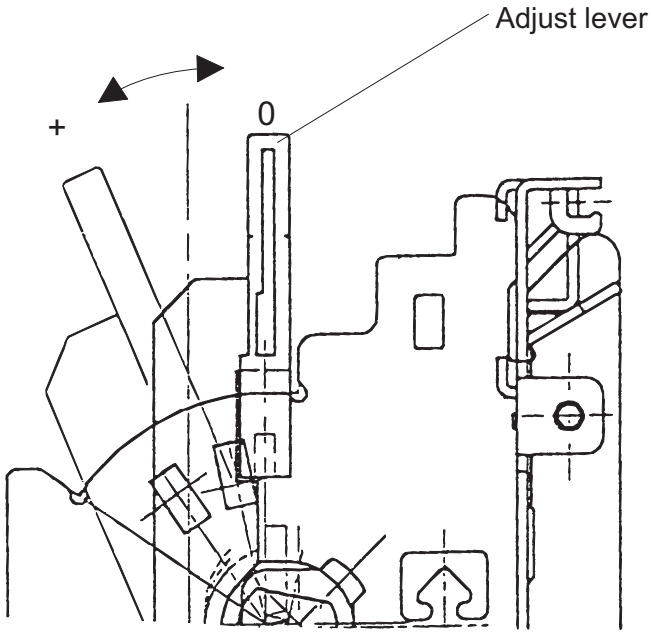


Figure 1-6. Adjust Lever Settings

1.2.8 Ink Specification

1.2.8.1 Black ink cartridge

Table 1-13. Black Ink Cartridge Specifications

Black Ink Cartridge	
Type	Exclusive ink cartridge
Color	Black
Print capacity	900 pages / A4 (ISO/IEC10561 Letter Pattern at 360 dpi)
Ink life	2 years from indicated production date
Storage Temperature	At storage : -20 •• to 40 •• *1 At packing storage : -30 •• to 40 •• *1 At transit (Packed) : -30 •• to 60 •• *1 *2
Dimension	30 mm (W) X 58 mm (D) X 38.5 mm (H) (1.22" X 2.36" X 1.57")

*1 : Within a month at 40 ••

*2 : Within 120 hours at 60 •• for more than 120 hours.

1.2.8.2 Color ink cartridge

Table 1-14. Color Ink Cartridge Specifications

Color Ink Cartridge	
Type	Exclusive ink cartridge
Color	Magenta, Cyan, Yellow
Print capacity	300 pages A4 (at 360 dpi, 5 % duty each color)
Ink life	2 years from indicated production date
Storage Temperature	At storage : -20 •• to 40 •• *1 At packing storage : -30 •• to 40 •• *1 At transit (Packed) : -30 •• to 60 •• *1 *2
Dimension	42.9 mm (W) X 56.5 mm (D) X 38.5 mm (H) (1.75"X 2.30" X 1.57")

*1 : Within a month at 40 •• for more than a month.

*2 : Within 120 hours at 60 •• for more than 120 hours.

Note)

1. *The cartridge must not be refilled. Only ink cartridge is prepared for article of consumption.*
2. *Do not used the cartridge that has exceeded the ink life.*
3. *When the ink is frozen under -4°C, leave it for more than 3 hours at the room temperature to defrost before using.*

1.2.9 Input Data Buffer

- Input data buffer :64 Kbytes

1.2.10 Electric Specifications

- 120 V version
  - Rated voltage :AC 120 V
  - Input voltage range :AC 103.5 to 132 V
  - Rated frequency renege :50 to 60 Hz
  - Input frequency range :49.5 to 60.5 Hz
  - Rated current :0.7 A (maximum)
  - Power consumption :Approximately 21 W (ISO/IEC 10561 Letter pattern) Conforms to Energy Star program
  - Insulation resistance :10 M ohms min. (Between AC line and chassis, DC 500 V))
  - Dielectric strength :AC 1,000 V rms. (1 minute) or AC 1,200 V rms. (1 second) (Between AC line and chassis)
- 220 - 240V version
  - Rated voltage :AC 220 to 240 V
  - Input voltage range :AC 198 to 264 V
  - Rated frequency renege :50 to 60 Hz
  - Input frequency range :49.5 to 60.5 Hz
  - Rated current :0.4 A (maximum)
  - Power consumption :Approximately 21 W (ISO/IEC 10561 Letter pattern) Conforms to Energy Star program
  - Insulation resistance :10 M ohms min. (Between AC line and chassis, DC 500 V)
  - Dielectric strength :AC 1,500 Vrms. (1 minute) (Between AC line and chassis)

1.2.11 Environmental Conditions

- Temperature
  - Operating*1 :10•• to 35••
  - Non operating*2 :-20•• to 40•• (1 month at 40••) -20•• to 60•• (120 hours at 60••)
- Humidity
  - Operating*1 *3 :20% to 80% RH (without condensation)
  - Non operating*2 *3 :5% to 85% RH (without condensation)
- Resistance to vibration
  - Operating :0.15 G
  - Non-operating*2 :0.50 G
- Resistance to shock
  - Operating :1 G within 1 ms
  - Non-operating*2 :2 G within 2 ms

*1 :Refer to the table below for guaranteed range.
*2 :In shipment container.
*3 :Without condensation

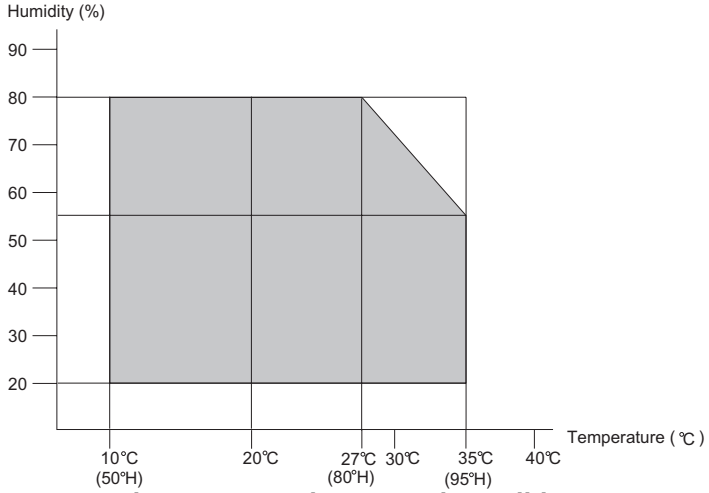


Figure 1-7. Environmental Conditions

1.2.12 Reliability

- Total print volume :75,000 pages (A4/Lletter)
- Print head life :2,000 million dots /nozzle

1.2.13 Safety Approvals

- 120 V version
  - Safety standards :UL1950 with D3
    CSA22.2 No. 950 with D3
  - EMI :FCC part15 subpart B class B
- 220 - 240 V version
  - Safety standards :EN 60950 (TÜV, NEMKO)
  - EMI :EN 55022 (CISPR Pub.22) class B
    :AS/NZS 3548 class B)

1.2.14 CE Marking

- 220 - 240 V version
  - Low Voltage Directive 73/23/EEC :EN60950
  - EMC Directive 89/336/EEC :EN55022 class B
    EN61000-3-2
    EN61000-3-3
    EN50082-1
    IEC801-2
    IEC801-3
    IEC801-4

1.2.15 Acoustic Noise

- Noise level :Approximately 45 dB (A) (According to ISO 7779)

1.3 Interfaces

1.3.1 Parallel Interface

1.3.1.1 Forward Channel Specifications

- ❑ Transmission mode :8 bit parallel , IEEE-P1284 compatibility mode
- ❑ Synchronization :/STROBE pulse
- ❑ Handshaking :BUSY and /ACKNLG signal
- ❑ Signal level :TTL compatible level (IEEE-P1284 Level 1 device)

Table 1-15. Signal level of TTL Compatible (IEEE-1284 level 1 device)

Parameter	Minimum	Maximum	Condition
VOH*	-	5.5 V	
VOL*	-0.5 V	-	
IOH*	-	0.32 mA	VOH = 2.4 V
IOL*	-	12 mA	VOL = 0.4 V
CO	-	50 pf	
VIH	-	2.0 V	
VIL	0.8 V	-	
IIH	-	0.32 mA	VIH = 2.0 V
IIL	-	12 mA	VIL = 0.8 V
CI	-	60 pf	

*Note) * : A low logic level on the Logic H signal is as follows:*
2.0 V or less when the printer is powered off.
3.0 V or more when the printer is powered on.
The receiver shall provide an impedance equivalent to 7.5 K ohm top ground.

- ❑ Adaptable connector :57-30360 (Amphenol) or equivalent

The BUSY signal is set high before setting either /ERROR low or PE high and held high until all these signals return to the inactive state.
The BUSY signal is at high level in the following cases:

- During data entry (see Figure 1-8. Data Transmission Timing below.)
- When the input data buffer is full
- While /INIT signal is at low level or during hardware initialization
- During a printer error condition (See /ERROR signal)
- During test printing
- When the printer is in default setting mode
- When the parallel interface is not selected

The ERROR signal is at low level when one of the following errors has occurred:

- Printer hardware error (fatal error)
- Paper-out error
- Paper-jam error
- Ink-out error

The PE signal is high level during paper-out error.

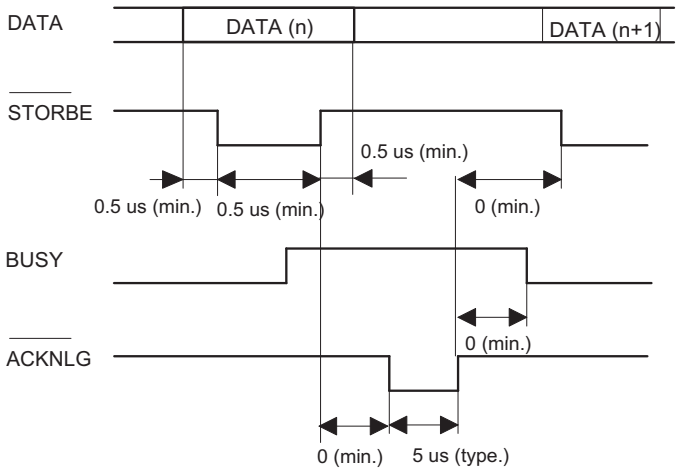


Figure 1-8. Data Transmission Timing

Table 1-16 shows the connector pin assignment and signals for forward channel of the parallel interface.

Table 1-16. Data Transmission Timing

Parameter	Minimum	Maximum
tsetup	500 ns	-
thold	500 ns	-
tstb	500 ns	-
tready	0	-
tbusy	-	500 ns
tt-out*	-	120 ns
tt-in**	-	200 ns
treply	-	-
tack	500 ns	10 us
tnbusy	0	-
tnext	0	-

*Note) * : Rises and falls in time of every output signals.*
***: Rises and falls in time of every input signal.*

Table 1-17. Connector Pin Assignments and Signals (Forward Channel)

Pin No.	Signal Name	Return GND Pin	I/O	Description
1	/STROBE	19	I	The strobe pulse. Read-in of data is performed at the falling edge of this pulse.
2-9	DATA 0-9	20-27	I	The data 0 to data 7 signals represent data bits 0 to 7, respectively. Each signal is at high level when data is logical 1 and low level when data is logical 0.
10	/ACKNLG	28	O	This signal is a negative pulse indicating that the printer can again accept data.
11	BUSY	29	O	When this signal is at high level, the printer is not ready to accept data.
12	PE	28	O	When this sign is at high level, the paper empty status is detected.
13	SLCT	28	O	Always at high level when the printer is powered on.
14	/AFXT	30	I	Not used.
31	/INIT	30	I	The falling edge of a negative pulse or a low signal on this line causes the printer to initialize. Minimum 50 us pulse is necessary.
32	/ERROR	29	O	When the printer detects an error, this signal goes low.
36	/SLIN	30	I	Not used.
18	Logic H	-	O	Pulled up to +5V via 3.9 K ohm resistor.
35	+5V	-	O	Pulled up to +5V via 3.3 K ohm resistor.
17	Chassis GND	-	-	Chassis ground.
16,33,19-30	GND	-	-	Signal ground.
15,34	NC	-	-	Not connected.

*Note) 1. */* at the beginning of a signal means active low.*
2. The I/O column indicates the diction of the signal as viewed form the printer.

1.3.1.2 Reverse Channel Specifications

- Transmission mode :IEEE-1284 nibble mode
- Adaptable connector :Same as for the forward channel
- Synchronization :Refer to the IEEE-1284 specification
- Handshaking :Refer to the IEEE-1284 specification
- Data transmission timing :Refer to the IEEE-1284 specification
- Signal level :IEEE-1284 level 1 device
  See the forward channel specification.

Table 1-18 shows the connector pin assignment and signals for reverse channel of the parallel interface.

Table 1-18. Connector Pin Assignment and Signals (Reverse Channel)

Pin No.	Signal Name	Return GND Pin	I/O	Description
1	HostClk	19	I	Clock signal from the host computer.
2-9	DATA 0-7	20-27	I	These signals represent parallel data information on bits 2 to 9.Each signal is High when the data is logical 1 and low when the data is logical 0.
10	PtrClk	28	O	Clock signal from the printer
11	PtrBusy / Data bits 3,7	29	O	Busy signal from the printer. Data bit 3 or 7 in reverse channel.
12	AckDatareq / AckData Bits 2,6	28	O	Acknowledge request signal. Data bit 2 or 6 in reverse channel.
13	Xflag/Data bit 1,5	28	O	X flag signal. Data bit 1 or 5 in reverse channel.
14	HostBusy	30	I	Busy signal from the host computer
31	/INIT	30	I	Not used
32	/Data Avail / Data bits 0,4	29	O	Data available signal. Data bit 0 or 4 in reverse channel.
36	1284-Active	30	I	1284 active signal.
18	Logic-H	-	O	Pulled up to +5V via 3.9 K ohm resistor.
35	+5V	-	O	Pulled up to +5V via 3.3 K ohm resistor.
17	Chassis GND	-	-	Chassis ground for the printer.
16,33,19-30	GND	-	-	Signalground.
15,34	NC	-	-	Not connected.

*Note) The symbol */* at the beginning of a signal means active low.*

- Extensibility Request
  The printer responds affirmatively when the extensibility request values are 00H or 04H, as follows:
  00H :Request Nibble Mode Reverse Channel Transfer.
  04H :Request Device ID;
  Return Data Using Nibble Mode Rev Channel Transfer.
- Device ID
  The printer sends following device ID string when it is requested.
  [00H] [xxH]
  MFG :EPSON;
  CMD :ESCP2E, PRPXL;
  MDL :Stylus COLOR 1520;
  CLS :PRINTER

Note) [00H] denotes a hexadecimal values of zero.

1.3.2 Mac Serial Interface

1.3.2.1 Serial Interface Specifications

- ❑ Standard :RS-423 compliance
- ❑ Synchronization :Synchronous
- ❑ Bit rate :Approximately 900 Kbps, 1.8 Mbps
- ❑ Word format :Start bit 1 bit
  :Data bit 8 bit
  :Parity bit No parity bit
  :Stop bit 1 bit
- ❑ Handshaking :X-ON/XOFF, DTR protocol
- ❑ Adaptable connector :8-pin mini circular connector
- ❑ Recommended I/F cable :Apple System Peripheral-8 cable

Table 1-19. Connector Pin Assignment for Serial Interface

Pin No.	Signal Name	I/O	Function Description
1	SCLK	O	Synchronous clock
2	CTS	I	Clear to send
3	TxD-	O	Transmit data -
4	S.G.	I	Signal Ground
5	RxD-	I	Receive data -
6	TxD+	O	Balanced Transmit +
7	DTR	O	Data terminal ready
8	RxD+	I	Balanced Receive +

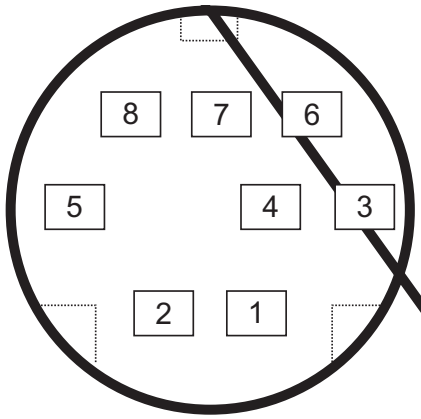


Figure 1-9.
Serial Interface Connector Pin Assignment

Table 1-20. X-ON/X-OFF, DTR Protocol

State	Buffer space	X-ON/X-OFF	DTR
Busy	Less than 1024 bytes	Send X-OFF code	Off
Ready	More than 2048 bytes	Send X-ON code	On

1.3.3 Optional Interface

The EPSON Stylus COLOR 1520 supports an optional Type-B interface (Level 2) with the following characteristics.

- Reply message
  - When ESC/P2 is selected:
    Main type :MTP48p, PW136cl10cpi, PRG(W0xxxx)rev, AP800ma, SPD0fast
    Product name :Stylus COLOR 1520
    Emulation type :ESCPL2-00
    Entity type :EPSONLQ2
  - When X24E is selected:
    Main type :MTP48p, PW136cl10cpi, PRG(W0xxxx)rev, AP800ma, SPD0fast
    Product name :Stylus COLOR 1520
    Emulation type :PRPXL24-00
    Entity type :EPSONPRPXL24

Table 1-21.Reply for Option Command

Option command No.	command name	Reply-A	Reply-B
00h	No Operation	Accept	None
01h	Start Hard Ware Reset	Accept	Excute OK
02h	Start Soft Ware Reset	Reject	
03h	Send Main System Type	Accept	
04h	Send Name Data	Reject	
05h	Inquire Name Data	Accept	
06h	Send Product Name	Accept	
07h	Send Soft Ware Emulation Type	Accept	
08h	Complete Buffered Data	Accept	Check Condition
09h	Stop Procedure	Reject	Execute OK
0Ah	Return Buffered Data	Reject	
0Bh	Send Entity Type	Accept	
0Ch	Send Status	Accept	
0Dh	Quit Procedure	Reject	
0Eh	Inquire ASCII Message	Reject	
0Fh	Send ASCII Message	Accept	None
10h - 13h		Unknown	None
14h	Inquire Emergency Message	Accept	Execute OK
15h	Send Emergency message	Accept	
16h - 1Fh		Unknown	None
20h - FFh		Reserved	None

Table 1-22. Supported Main Command and Sending Timing

Main Command No.	Command name	Sending Timing
01h	Start Software Reset	■/INIT signal on the std. parallel I/F ■Type-B I/F option command : 01h ■Cold Start
04h	Send Name Data	■Type-B I/F command : 05h
07h	Inquire Software Emulation Name	■Changing software Emulation Type
0Eh	Inquire ASCII Message	■Writing to DBIN register
14h	Inquire Emergency Reply	■Reply for Emergency command
15h	Send Emergency Message	■Receive Emergency Command

- Emergency Command
  0X00 :Get device ID
  0X01 :Get all status
- Sending BDC-ST through DBIN register
  When State-Reply is set “ON”, by ST from Type-B I/F, sending BDC-ST through DBIN register is started. When State-Reply is started, “Start” and “End” of BDC-ST characters are announced by sending the Main command 0Eh.

1.3.4 Prevention Hosts from Data Transfer Time-out

Generally, hosts abandon data transfer to peripherals when a peripheral is in the busy state for dozens of seconds continuously. To prevent hosts from this kind of time-out, the printer receives data very slowly, several bytes par minute, even the printer is in busy state. This slowdown starts when the rest of input buffer drops under several hundreds of bytes. Finally, the printer is in the busy state continuously when the input buffer is full.

1.3.5 Interface Selection

The EPSON Stylus COLOR 1520 has three types of interface available :Parallel, Serial, and optional interfaces. Each interface can be selected manually or automatically. Both modes are selected thorough the default setting mode.

- Manual selection
  The interface selected through the default setting mode always prints out data from the host.
- Automatic selection
  When the printer is in this mode, the printer is initialized to the idle state when it is turned on. Then the interface that receives data first will print. When the host stops data transfer and the printer is in the stand-by state for the specific time, the printer returns to the idle state. As long as the host sends data or the printer interface is buy state, the selected interface remains active.

Interface State and Interface Selection
When the parallel interface is not selected, the interface goes into the busy state. When the serial interface is not selected, the interface sets the DTR signal MARK. When the printer is initialized or returned to the idle state, the parallel interface goes into the ready state and the serial interface sets the DTR signal SPACE. Caution that the interrupt signal such as the /INIT signal on the parallel interface is not effective while that interface is not selected.

1.3.6 Printer language and Control Codes

- Printer languages and control codes :ESC/PC
  :IBM X24E
  :EPSON Remote

1.4 Operation

This section describes the controls, settings and adjustment used to operate the EPSON Stylus COLOR 1520.

1.4.1 Control Panel

The control panel of this printer consists of 6 non-lock push switches, 1 lock type push switch, and 6 LED indicators for easy operation of the various printer functions. Refer to Figure 1-10 for button and LEDs descriptions and how they are arranged.

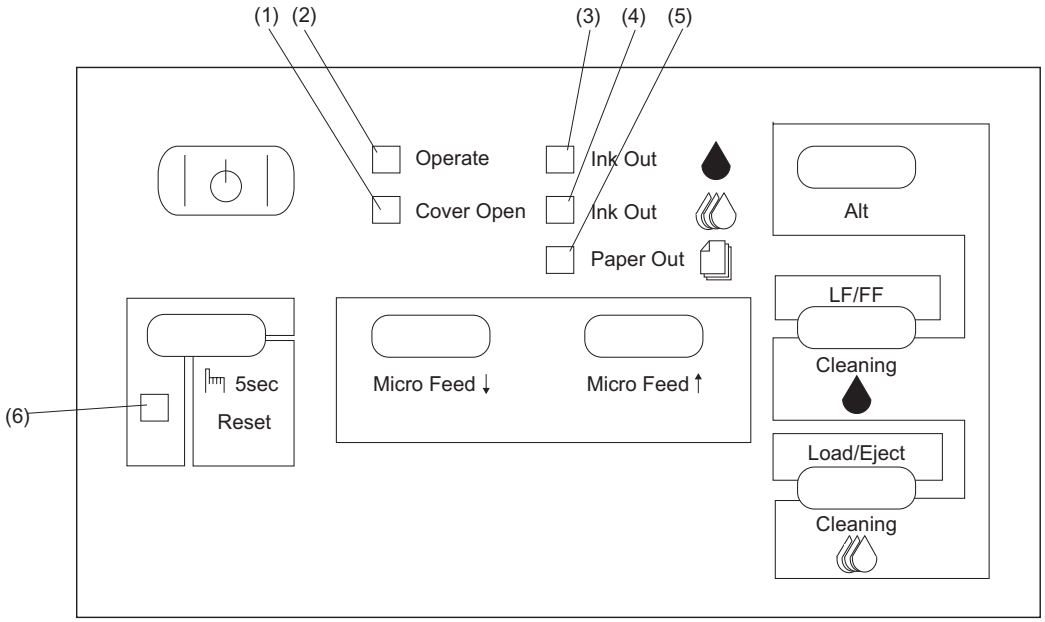


Figure 1-10. Control Panel Appearance

- Indicators
  - (1) Cover Open
  - (2) Operate
  - (3) Ink Out (Black)
  - (4) Ink Out (Color)
  - (5) Paper Out
  - (6) Pause

❑ Panel Functions :The function of each button is described below.

- ■ **Power**
  Function :Turns the printer off or on *[1].
  Available condition :Always
- ■ **Load/Eject**
  Function :Loads and ejects the paper.
  Available condition :Pause/Stand-by
- ■ **LF/FF**
  Function :Feeds one line or page.
  Available conditions :Pause / Stand-by
- ■ **Pause**
  Function :Alternates the printer state between printing and non-printing.
  Available conditions :Pause / Stand-by

  Function : Pressing this button for 3 seconds resets the printer.
  Available condition :Pause / Stand-by
- ■ **Micro-adjust ↑**
  Function :Feeds paper forward and is used to execute TOF adjustment *[2] and Tear off adjustment *[3].
  Available conditions :Pause / Stand-by
- ■ **Micro-adjust ↓** *[2]
  Function :Feeds paper backward and performs TOF adjustment and Tear off adjustment *[3].
  Available conditions :Pause / Stand-by
- ■ **Cleaning (Black)**
  Function :Executes the black ink cartridge cleaning.
  Available condition :Pause
- ■ **Cleaning (Color)**
  Function :Executes the color ink cartridges cleaning.
  Available condition :Pause
- ■ **Alt**
  Function :Enters ink cartridge change mode. Pressing this button for 3 seconds moves the ink cartridge to the position to be replaced.
  Available conditions :Pause / Ink out

Note)

1. *Before the printer power is off, the printer executes the capping function.*
2. *When the micro adjust is performed at the TOF (Top Of Form position) for the ASF manual and tractor feed, the new setting is stored in the corresponding address in the EEPROM.*
3. *When the micro adjust is performed at the tear off position, the new setting is stored in the corresponding address in the EEPROM*

⚠ CAUTION

☑ *The power switch is connected to the secondary side of the electrical circuit. Since it has a delay circuit, voltage is still applied for the specified period of time after the printer power is off.*

☑ *As long as the printer is plugged in, voltage is applied to the primary side of the electrical circuit. Therefore be sure to unplug the printer before servicing or replacing the interface.*

1.4.2 Panel Functions at Power On

This printer also enters various functions by turning on the printer while holding down a button (buttons). Each combination and corresponding function is described in the table below.

Table 1-23. Panel Functions at Powered On

Switch *[1] (while turning on the printer)	Function
Micro adjust ↓	Enters default setting mode. (See Section 1.4.4.)
Pause	Enters printer adjustment mode. (See Section 1.4.5.)
Load /Eject	Enters LQ self-test printing mode.
LF/FF	Enters draft self-test printing mode.
LF/FF + Load/Eject	Enters hex-dump mode.
Alt + LF/FF + Load/Eject + Micro adjust ↑	Enters EEPROM and Timer IC reset *[2] mode.

Note) 1."+" means to press one button while holding down the other button(s).
2.EEPROM and Timer IC must be reset only by qualified service personnel.

⚠CAUTION

When performing EEPROM reset operation, waste ink drain pads must be replaced. Therefore EEPROM reset is to be performed by a qualified service person only. (See Chapter 3.)

1.4.3 Printer Condition and Panel Status

This printer has several printer conditions that are indicated by the LEDs on the control panel When any of the errors listed below occurs, the printer indicates an error condition and the /ERROR signal goes “Low” and Busy signal goes “High” to stop data transfer. This condition automatically puts the printer into “Pause” status.

- The carriage moves abnormally. (Fatal error)
- Paper out or Paper jam condition is detected.
- The PG for the paper currently loaded is inaccurate.
- No ink cartridge or Ink end condition is detected.
- Maintenance is required.

Table 1-24. Printer Condition and Panel Status

Printer status	Indicators					
	Power	**Cover Open**	**Ink out (black)**	**Ink out (color)**	**Paper Out**	**Pause**
Power on	On	—	—	—	—	—
Cover open	—	On	—	—	—	—
Paper out	—	—	—	—	On	—
Paper jam	—	—	—	—	Blinks	—
No ink cartridge or ink end (black)	—	—	On	—	—	—
Ink level low (black)	—	—	Blinks	—	—	—
No ink cartridge or ink end (color)	—	—	—	On	—	—
Ink level low (color)	—	—	—	Blinks	—	—
Enter EEPROM and Timer IC reset	On 1 second	On 1 second	On 1 second	On 1 second	On 1 second	On 1 second
Maintenance request	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks
Fatal error	—	Blinks	—	—	—	Blinks
Lever error	—	—	—	—	Blinks	Blinks
Capping function in the power off	Blinks	—	—	—	—	—
Data exit	Blinks	—	—	—	—	—
In the sequence of ink cartridge change mode	—	—	—	—	—	Blinks
Default setting mode	Blinks	—	—	—	—	—

Note)

1. *“—” means no effect.*
2. *Fatal error is cleared by turning off and back on the printer or by inputting the /INIT signal after the problem is solved.*
3. *Maintenance is required when the wasted ink drain pads are filled with the wasted ink to the specified limit. On this condition servicing is needed. To clear the condition, perform EEPROM reset operation. (See Section 1.4.2 “Panel function at power on”) Refer to Chapter 2 or Chapter 3.*

1.4.4 Cover Open Sensor Operation

The cover open sensor equipped with this printer controls the carriage movement which has a possibility to hurt the user. The sensor performs followings:

- ❑ The printer cover opens during printing:
  - ■ The CR returns to the home position slowly after executing printing for the current pass. The cover open LED lights up and the printer goes into the stand-by status.
  - ■ To recover, close the cover and press the pause button to continue to print. The cover open LED goes off with the recovery.
- ❑ The printer cover opens during cleaning:
  - ■ The printer completes the cleaning sequence. If the cover is still open after the cleaning, the cover open LED lights up and the printer goes into the stand-by status.
  - ■ To recover, close the cover and press the pause button to continue to print. The cover open LED goes off with the recovery.
- ❑ The printer cover opens While the printer is in the stand-by status:
  - ■ The cover open LED lights up and the printer stops functioning. *[1]
  - ■ To recover, close the printer cover.

*1 :The interface is in the Busy status and the switches on the control panel are effective.

1.4.5 Default Setting

This printer has user-selectable default settings to which it refers at initialization. This section describes setting method and setting menus.

1.4.5.1 Setting Method

See the flow chart in Page 1-26 for the default setting method.

⚠CAUTION

☑ *Be sure to turn off the printer off once after the default setting operation is executed, since adjustment values are not stored in the EEPROM until the printer is turned off.*

☑ *The latest adjustment values set before power-off are stored in the EEPROM.*

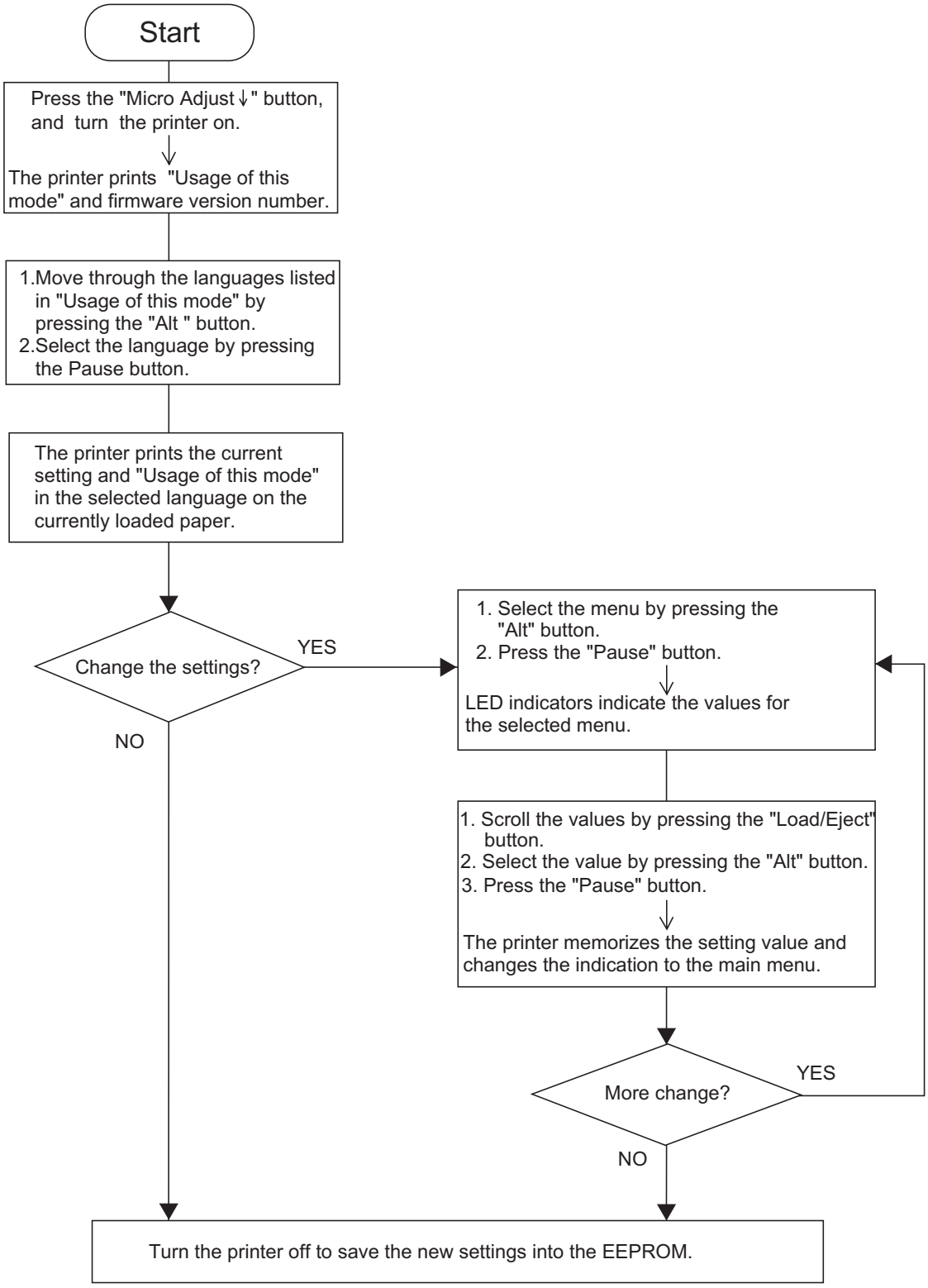

Start
Press the "Micro Adjust↓" button, and turn the printer on.
The printer prints "Usage of this mode" and firmware version number.
1.Move through the languages listed in "Usage of this mode" by pressing the "Alt " button.
2.Select the language by pressing the Pause button.
The printer prints the current setting and "Usage of this mode" in the selected language on the currently loaded paper.
Change the settings?
YES
NO
1. Select the menu by pressing the "Alt" button.
2. Press the "Pause" button.
LED indicators indicate the values for the selected menu.
1. Scroll the values by pressing the "Load/Eject" button.
2. Select the value by pressing the "Alt" button.
3. Press the "Pause" button.
The printer memorizes the setting value and changes the indication to the main menu.
More change?
YES
NO
Turn the printer off to save the new settings into the EEPROM.

Figure 1-11. Default Setting Flowchart

1.4.5.2 Setting Menus

The default setting menus are described in the table below.

Table 1-25. Default Setting Menu

Menu	Setting *[1]
Print direction*[2]	**Auto** / Bi-d / Uni-D
Font	Roman / Sans Serif / **Courier** / Prestige / Script/ Roman T / Sans Serif H / Draft
Pitch	**10 cpi** / 12 cpi / 15 cpi / 17.1 cpi / 20 cpi / Proportional
I/F mode	**Auto** / Parallel / Mac Serial / Option
Auto I/F wait mode	**10 seconds** / 30 seconds
Software	**ESC/P2** / IBM X24E
Auto CR (IBM mode only)	On / **Off**
AGM (IBM mode only)	On / **Off**
Character tables Standard version	Italic **PC 437**, PC 850 PC 860, PC 863 PC 865, PC 861 BRASCII, Abicomp Roman 8, ISO Latin 1 PC 437 (Greek), PC 853 PC 855, PC 852 PC 857, PC 866 PC 869, MOZOAWIA Code MJK, ISO 8559-7 ISO Latin 1T, Bulgaria PC 774, Estonia ISO 8859-2, PC 866 LAT
International character set for Italic table	**Italic USA**, Italic France Italic Germany, Italic U.K Italic Denmark, Italic Sweden Italic Italy, Italic Spain 1
Auto line feed	On / **Off**
Network I/F mode	This mode is for network environment. **Off**: Used in usual environment On: Used in network environment
0 slash	0 / 0 with slash
Page length	11 inch / 12 inch / 8.5 inch / 70/6 inch / other
Skip over perforation	On / **Off**
Auto tear off	**On** / Off
Banner mode *[3]	On / **Off**
Parallel I/F transfer rate	**Fast** / Normal

Note) 1. Underlined parameters in bold letter are factory default settings.
2. Refer to Table 1-26 and Table-27.
3. Refer to Table 1-28..

Table 1-26. Print Direction Mode Characteristics

	Black and White Printing	YMCK Printing (color)
Auto	• Throughput and quality is better.	• Throughput is better. • Color quality with special paper is worse. (Color correction depends on the print direction.)
Bi-D	• Throughput is the best. • Print quality may be down.	• Throughput is the best. • Color quality with special paper is worse. (Color correction depends on the print direction.)
Uni-D	• Throughput is worse. • Print quality is the best.	• Throughput is worse. • Color quality is the best.

Table 1-27. Printing Direction and ESC U Command

			Character Mode (for DOS)	Taster Graphics Mode (for Windows / Mac)
Default Setting Mode	Auto	ESC U 0	Auto	Bi-D
		ESC U 1	Auto	Uni-D
		ESC U 2	Auto	Auto
		—	Auto	Auto
	Bi-D	ESC U 0	Bi-D	Bi-D
		ESC U 1	Uni-D	Uni-D
		ESC U 2	Auto	Auto
		—	Bi-D	Bi-D
	Uni-D	ESC U 0	Uni-D	Bi-D
		ESC U 1	Uni-D	Uni-D
		ESC U 2	Uni-D	Auto
		—	Uni-D	Uni-D

Table 1-28. Vertical Print Position in the manual Insertion

Trigger		Function	
		Banner mode Off (manual insertion operation)	Banner mode On
Command	FF	1. Case that page length is set by ESC (C → Eject 2. Case that page length is not set by ESC (C → Advances to the top-margin of the next page	Advances to the top-margin position of the next page.
	ESC EMR	No operation	No operation
Switch	FF	Eject	Advances to the top-margin position of the next page.
	Eject	Eject (maximum 44 inches)	Advances to the top-margin position of the next page.
Data	Over the page length set by command	1. Case that page length is set by ESC (C → Eject 2. Case that page length is not set by ESC (C → No operation	No operation
	Over the paper length	Eject	Eject

1.4.6 Printer Adjustment Mode

The EPSON Stylus COLOR 1520 allows users to adjust the printing direction and head gap without a special program. The following chart shows the adjustments method .

1.4.6.1 Adjustment Method

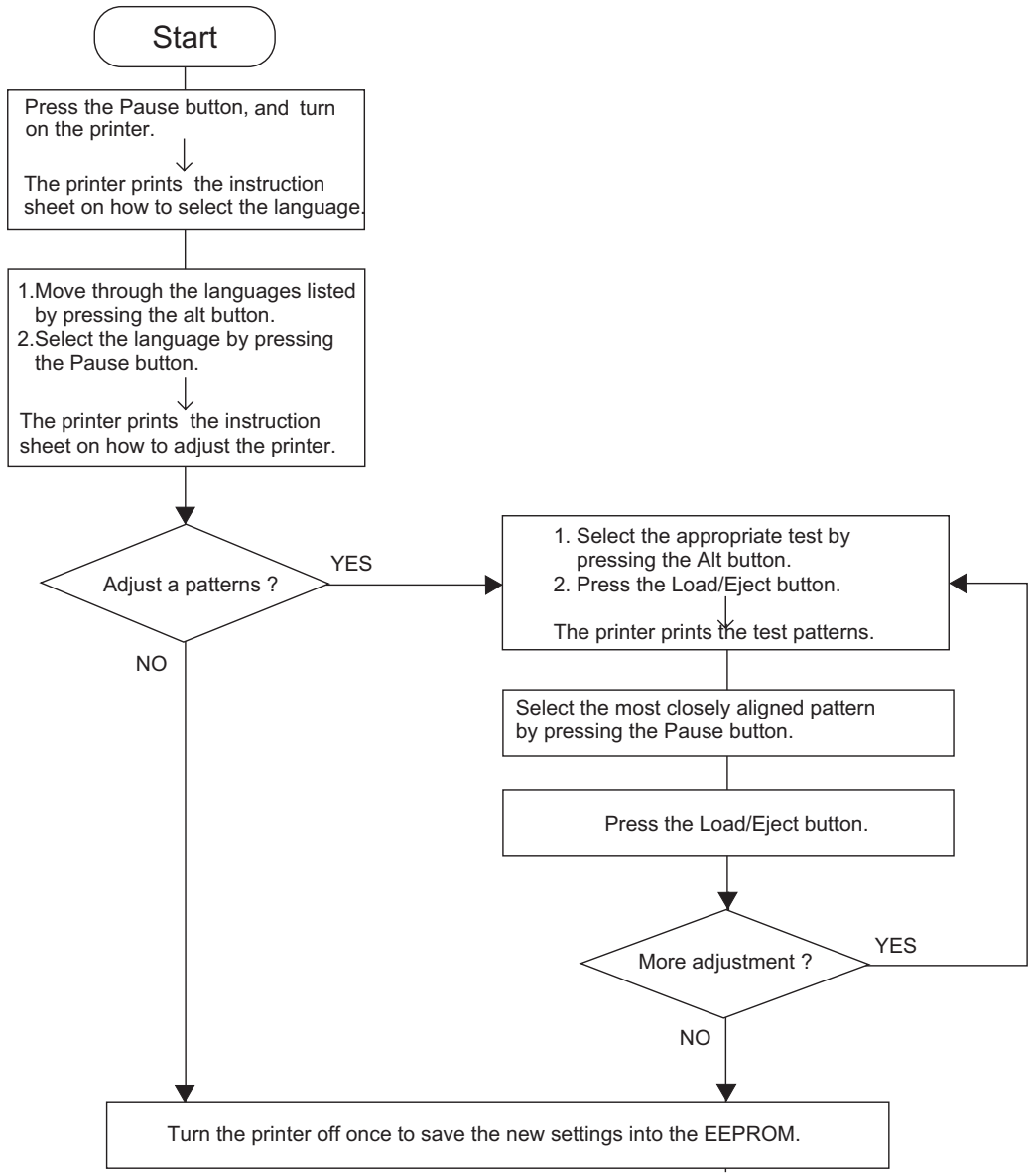

Start
Press the Pause button, and turn on the printer.
The printer prints the instruction sheet on how to select the language.
1.Move through the languages listed by pressing the alt button.
2.Select the language by pressing the Pause button.
The printer prints the instruction sheet on how to adjust the printer.
Adjust a patterns ?
YES
NO
1. Select the appropriate test by pressing the Alt button.
2. Press the Load/Eject button.
The printer prints the test patterns.
Select the most closely aligned pattern by pressing the Pause button.
Press the Load/Eject button.
More adjustment ?
YES
NO
Turn the printer off once to save the new settings into the EEPROM.

Figure 1-12. Printer Adjustment Flow Chart

1.4.6.2 Adjustment patterns

Table 1-29. Printer Adjustment Patterns

Pattern	Menu
Pattern 1	Uni-dir adjustment at 400 cps (with an increment of 1/1,440 inch)
Pattern 2	Bi-dir adjustment at 400cps (with an increment of 1/1,440 inch)
Pattern 3	Bi-dir adjustment at 200cps (with an increment of 1/1,440 inch)
Pattern 4	Head gap adjustment between black and color to the cross feed direction at 200 cps (with an increment of 1/720 inch)
Pattern 5	Head gap adjustment between black and color to the cross feed direction at 100 cps (with an increment of 1/720 inch)

1.4.7 Printer Initialization

This printer has three initialization types: Power-on initialization, Operator initialization, and Software initialization.

❑ Power-on Initialization

This printer is initialized when turning on the printer. Then the printer recognizes the cold reset command (Remote RS command). When the printer is initialized, following actions are performed:

- Initialize the printer mechanism.
- Clears input data buffer.
- Clears download character set.
- Clears print buffer.
- Sets default values.

❑ Operator Initialization

This printer is initialized when Pause button is pressed for 3 seconds, or the printer recognizes the /INIT signal (negative pulse) of parallel interface. When the printer is initialized, following actions are performed:

- Clears input data buffer.
- Clears download character set.
- Clears print buffer.
- Sets default values.

❑ Software Initialization

This initialization is performed by the ESC @ commend and the following actions are performed:

- Clears print buffer.
- Sets default values.

1.4.8 Self-test Printing Mode

This printer has the self-test printing mode. Following items are checked by performing this mode.

- Function for the control circuit board
- Function for the printer mechanism
- Print quality

The printer enters the LQ self-test printing mode by pressing the Load/eject button while turning on the printer. To enter the draft self-test printing mode by pressing the LF/FF button while turning on the printer.

1.4.9 Hexadecimal Dump Function

Pressing the LF/FF and Load/Eject buttons while turning on the printer activates the hexadecimal dump mode. Each line has Hexadecimal codes, along with their corresponding letters printed in the right column. If a received code denotes an unprintable character. Such as a control code, “.” (period) is printed in the right column. This function enables users to check whether the data from the host is properly transferred. Turn off the printer to exit the mode.

1.4.10 Monochrome Printing Mode

When the printer is in the ink end (color) condition, the black ink is substituted to continue to work. In order to switch to monochrome printing mode, turn the printer off and back on. This mode is also selected by the command “**ESC (K)**“. The Color select command “**ESC r**” is ignored in this mode.

1.5 Physical Specification

- Weight :6.5 Kg
- Dimension :666 mm (W) X 554 mm (D) X 202 mm (H)
  (26.2” X 21.8” X 7.9”)

Refer to Appendix for details.

1.6 Main Components

The main components of the EPSON Stylus COLOR 1520 are designed for easy removal and repair. They are as follows:

- ❑ Main control board :C211 MAIN Board
- ❑ Power supply board :C172 PSB/PSE Board
- ❑ Control panel bard
- ❑ Printer mechanism :M-4160
- ❑ Housing

1.6.1 C211 MAIN Board

This board consists of a 16-bit CPU (IC7) (clock wave : 19.66Mhz), gate arrays B05B33 (IC8) and B05B34 (IC6), PROM (IC14), MROM (IC12), DRAMs (IC9, 10), RESET ICs (IC1, 4), EEPROM (IC2), two motor drive ICs, printhead drive circuit, and so on.

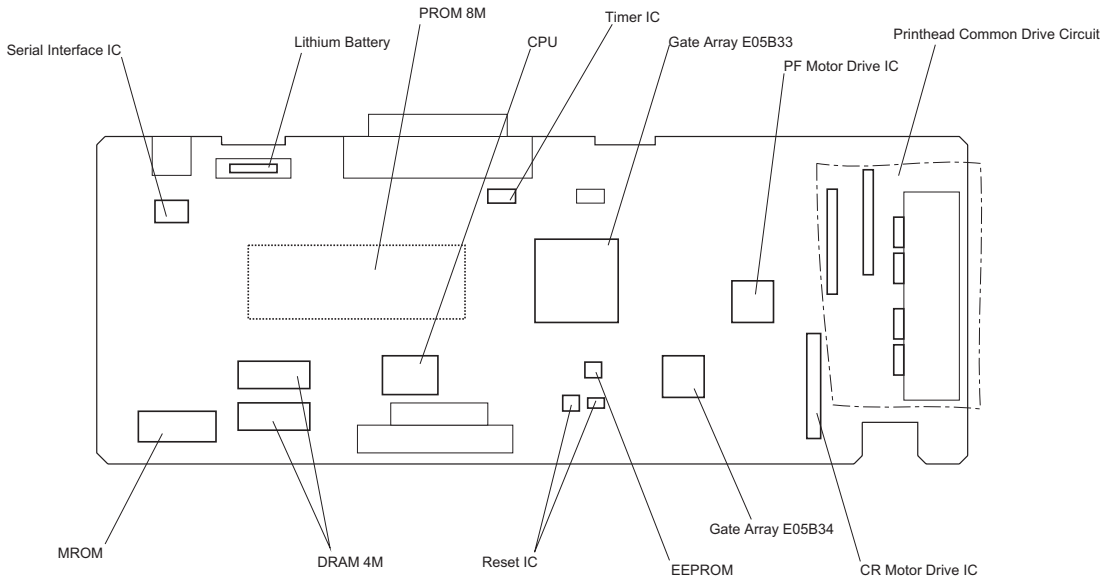


Figure 1-13. C211 MAIN Board Component Layout

1.6.2 C172 PSB/PSE Board

This board consists of a transformer, switching FET, regulator IC, diode bridge, fuse, and so on.

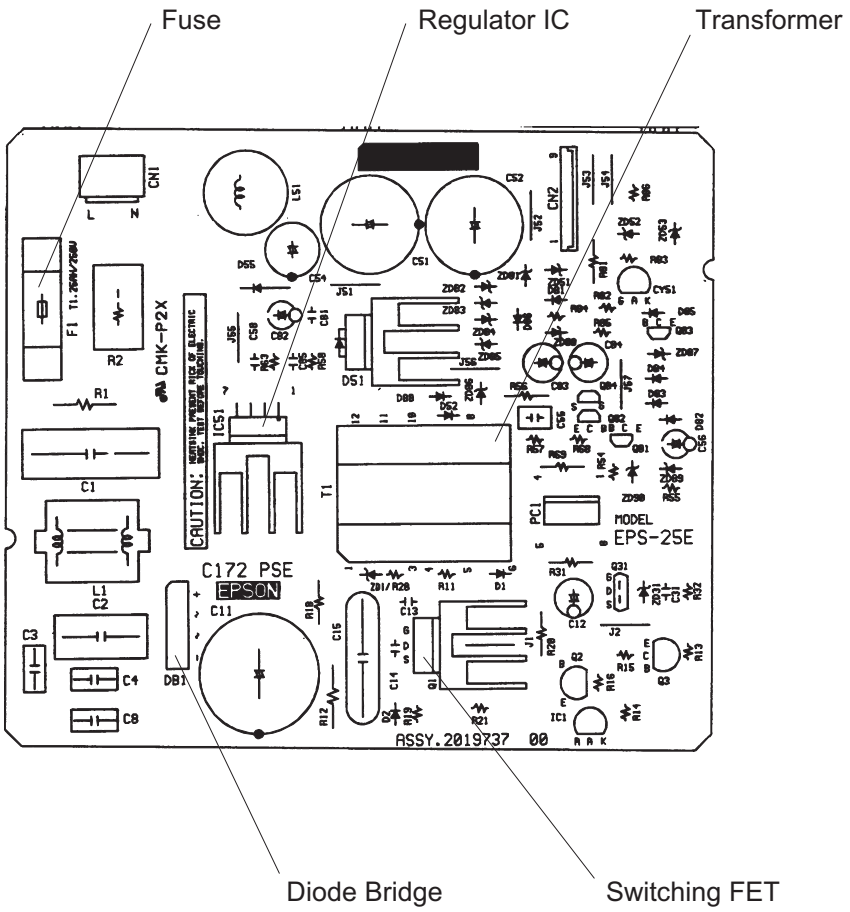


Figure 1-14. C211 PSB/PSE Board Component Layout

Chapter 2
Operating Principles

2.1. Overview 2-1

2.2. Printer Mechanism Operating Principle 2-1

2.2.1.1. M-4I60 Printer Mechanism 2-1

2.2.2. Printing Mechanism 2-2

2.2.2.1. Printhead Structure 2-2

2.2.2.2. Printing Process 2-3

2.2.2.3. Printing Methods 2-3

2.2.3. Carriage (CR) Mechanism 2-5

2.2.4. Paper Feed Mechanism 2-6

2.2.4.1. ASF (Auto Sheet Feeder) Mechanism 2-7

2.2.4.2. Tractor Mechanism 2-8

2.2.4.3. Manual Feed Mechanism 2-8

2.2.5. Platen Gap (PG) Adjust Mechanism 2-9

2.2.6. Ink System 2-10

2.2.6.1. Pump Mechanism 2-11

2.2.7. Capping Mechanism 2-14

2.2.7.1. Wiping/CR Lock Mechanism 2-15

2.3. Electrical Circuit Operation Principles 2-16

2.3.1. C172 PSB/PSE Electrical Circuit Board 2-16

2.3.2. C211 MAIN Control Board 2-18

2.3.2.1. Reset Circuits 2-20

2.3.2.2. Sensor Circuits 2-20

2.3.2.3. CR Motor Driver Circuits 2-22

2.3.2.4. PF Motor Driver Circuit 2-23

2.3.2.5. Printhead Driver Circuit 2-24

2.4. Ink System Management 2-27

2.4.1. Ink System Operations 2-27

2.4.2. Counters 2-28

2.1 Overview

This chapter describes the operating principle of the printer mechanism and electrical circuit.

2.2 Printer Mechanism Operating Principle

2.2.1.1 M-4I60 Printer Mechanism

This printer is composed of the printhead unit, paper feeding mechanism, CR mechanism and the pump mechanism. The block chart for the printer mechanism is shown in Figure 2-1. The printer mechanism of this printer has 2 motors: CR motor and PF motor. The torque from the CR motor moves the CR in the column direction. The torque from the PF motor is transmitted to 2 ways: to the paper feeding mechanism and to the pump mechanism. The direction is determined by the CR position. The release lever transmits the torque from the PF motor to the tractor side to feed continuous paper.

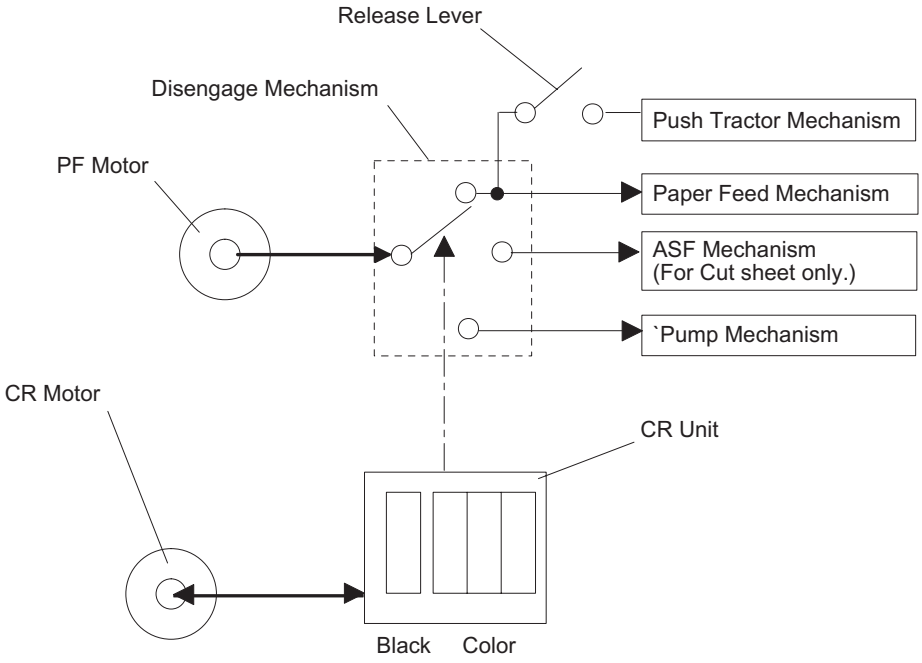


Figure 2-1. Printer Mechanism Block Diagram

2.2.2 Printing Mechanism

The printing method used for this printer is On-demand ink jet, same as for other EPSON ink jet printers. The new method used for the printhead enables the printer to produce output in high quality at a higher speed. The printing mechanism has 2 parts: ink cartridge and printhead. The ink cartridge is filled with ink.

2.2.2.1 Printhead Structure

The printhead for this printer has the black head and color head. The structures of the printheads are basically the same except for the nozzle configuration. The black head, used for the black ink only, is composed of 128 nozzles (32 nozzles for each of 4 rows) The color head, composed of 3 heads for Magenta, Cyan, and Yellow, has 64 nozzles (32 nozzles for each of 2 rows) for each color.

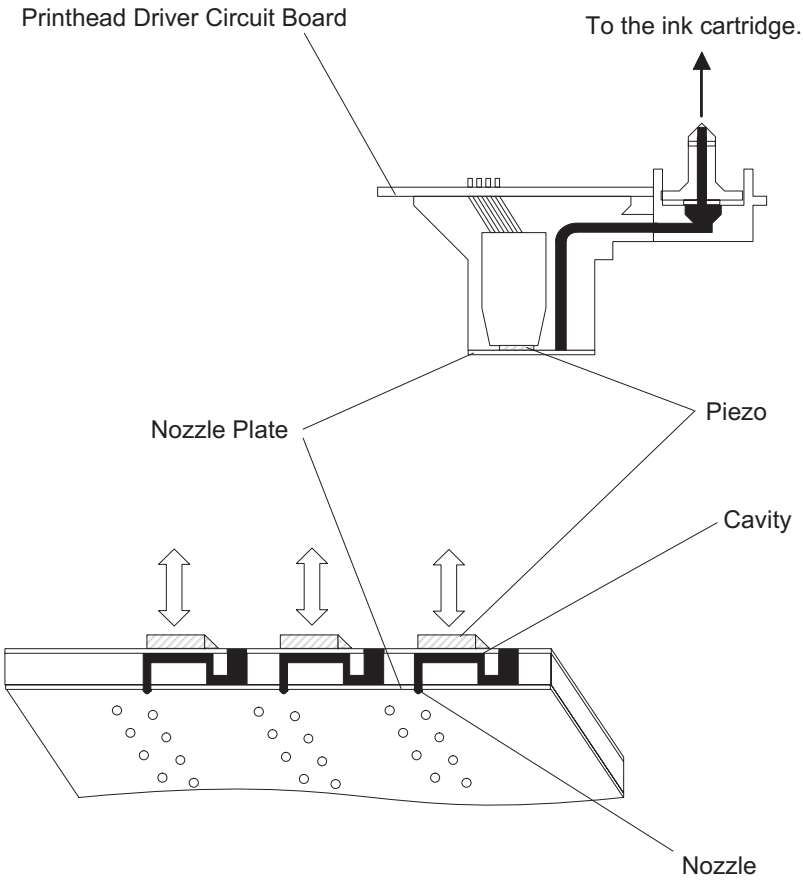


Figure 2-2. Printhead Structure

2.2.2.2 Printing Process

Steps bellow describe how the ink is ejected from each nozzle with the on-demand ink jet system.

<**Step 1**> **Normal state**

No print signal is applied to the PZT. In this state, the PZT does not displace and no pressure is added inside the cavity. Therefore the pressure in the cavity is kept at a constant level.

<**Step 2**> **Ejecting state**

Print signal is applied to a specific nozzle by the head driver circuit to drive the PZT of the nozzle. The voltage which drives the PZT is produced in the common driver circuit board on the control board. When the voltage is applied to the PZT, the PZT displaces and the pressure in the cavity changes. Then the ink is ejected as a result.

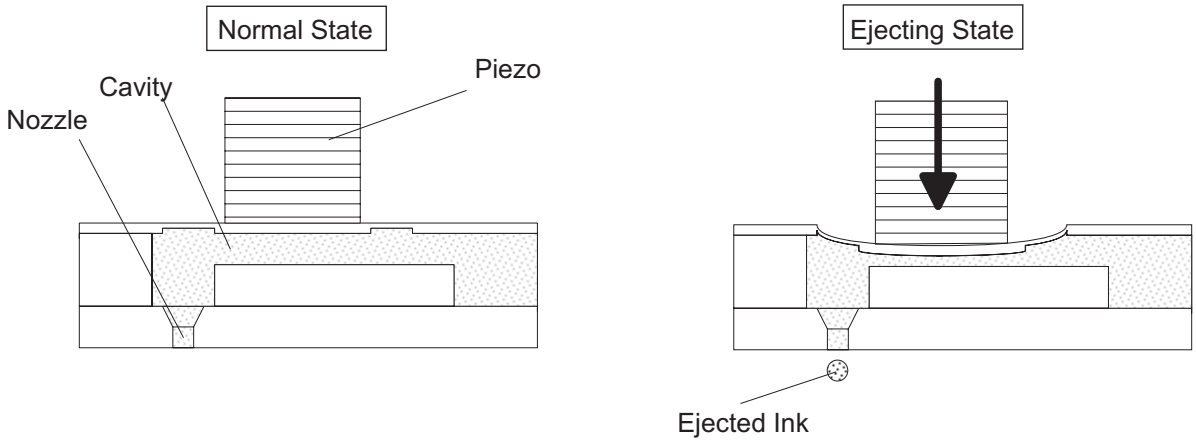


Figure 2-3. Printing Operation States

When no print signal is applied to the PZT, the PZT recovers from the displaced status. With this process, the cavity also returns to its normal size, which brings the pressure negative. The negative pressure in the cavity then absorbs the ink from the cartridge to fill the cavity with the ink again for the next printing motion. The ink which was not used for printing adheres on the nozzle surface and increases viscosity in the nozzles, and it causes printing malfunction. Therefore the ink is periodically absorbed and wasted into the waste ink drain pads by the pump mechanism. Ink viscosity varies depending on the temperatures around the head. Since the change in the ink viscosity causes decreas in the print quality, the thermistor is attached to the black head driver circuit board to control the drive voltage at the proper level referring to the detected head temperature.

2.2.2.3 Printing Methods

This printer has following special printing modes to print various types if graphic image.

- **Double Firing Normal dot / One dot printing mode**
  This printer forms 1 dot with double ink ejections in the ANK or bitmap image mode. In the raster graphics mode which requires a high-resolution-printing, however, forms 1 dot with a single ink ejection.

- **EPSON Micro dot printing**
  Both black and color printings can be performed in the normal dot printing mode and EPSON micro dot printing mode. In the normal dot printing mode, the printer uses less ink to create sharper dots. Therefore the gradation range is expanded with more delicate tone. This mode is available when the 1440X720-dpi-paper or glossy film is selected.

- **Micro Weave Printing**
  In this mode, nozzles to be activated are divided and only specific nozzles are used for each pass. The paper is also fed in a smaller increment for this operation. This mode eliminates white banding that occurs between lines to improve graphic images. Decrease in paper feed speed is, however, inevitable. The Micro Weave printing can be selected through the printer driver.

Table 2-1. Special Printing Availability

Paper Type	180 dpi	360 dpi	720 X 360 dpi	720 dpi	1440X720 dpi
Black printing for the raster data					
360 dpi exclusive paper	—	—	1 dot printing Normal dot Micro Weave	—	—
720 dpi exclusive paper	—	—		1 dot printing Normal dot Micro Weave	1 dot printing Normal dot Micro Weave
OHP sheet	—	2 dot printing Normal dot Micro Weave	—	—	—
Glossy film Glossy paper	—	—	—	1 dot printing Normal dot Micro Weave	1 dot printing Normal dot Micro Weave
Normal paepr	2 dot printing Normal dot Micro Weave	2 dot printing Normal dot Micro Weave	1 dot printing Normal dot Micro Weave	—	—
Color printing for the raster data					
360 dpi exclusive	—	—	1 dot printing Normal dot Micro Weave	—	—
720 dpi exclusive	—	—		1 dot printing Normal dot Micro Weave	1 dot printing Normal dot Micro Weave
OHP sheet	—	2 dot printing Normal dot Micro Weave	—	—	—
Glossy film Glossy paper	—	—	—	1 dot printing Normal dot Micro Weave	1 dot printing Normal dot Micro Weave
Normal paepr	2 dot printing Normal dot	2 dot printing Normal dot	1 dot printing Normal dot Micro Weave	—	—
For ANK, Bitmap image data					
360 dpi exclusive	2 dot printing Normal dot	2 dot printing Normal dot	—	—	—

2.2.3 Carriage (CR) Mechanism

The CR mechanism is composed of the CR unit, timing belt, CR guide shaft, paper eject frame, HP sensor (Home Position sensor) and CR motor. The CR motor sends torque to the timing belt to move the CR unit in the both right and left directions along the paper eject frame and CR guide shaft. A stepping motor used for the CR motor enables the CR unit to move and stop at any position. The CR is primarily detected at the home position by HP sensor when the printer is turned on and its position is then controlled by the open loop. Table 2-2 and Table 2-3 show the specification for the CR motor and the CR motor drive terms, respectively.

Table 2-2 CR Motor Specification

Item	Description
Motor type	4-phases / 200-pole / HB type stepping motor
Drive voltage	42 VDC ± 5% (The voltage applied to the driver)
Coil resistance	5 Ω ± 7% (at 25° C per 1 phase)
Excitation mode	Unipolar drive 1-2 phase, 2w1-2 phase : Constant current drive
Drive frequency	480 ~ 9600 Hz
Minimum step	0.106 mm (1-2 phase drive) 0.026 mm (2W1-2 phase drive)

Table 2-3 CR Motor Drive Terms

Print mode	Print speed	Acceleration 1	Acceleration 2	Constant	Deceleration 1	Deceleration 2
Draft	400 cps	0.96	0.96	0.70	0.70	0.70
LQ	200 cps	0.96	0.96	0.70	0.80	0.80
SLQ	100 cps	0.90	0.90	0.60	0.80	0.80

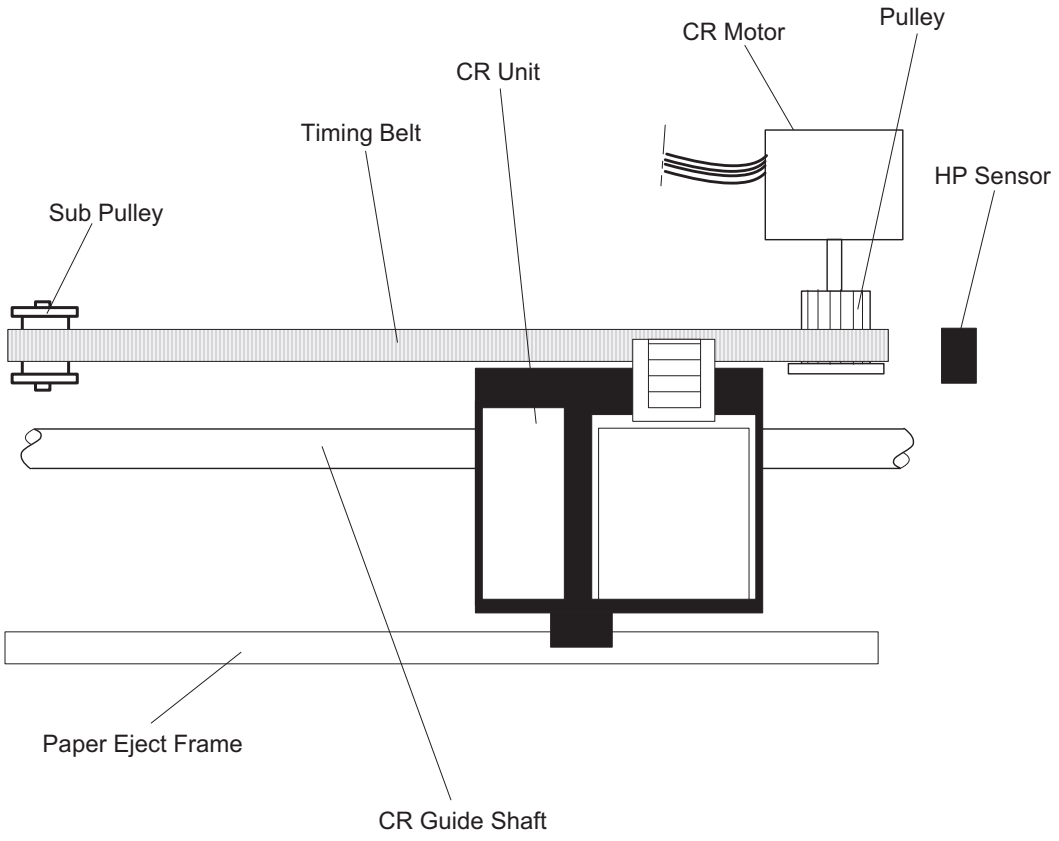


Figure 2-4. CR Mechanism

2.2.4 Paper Feed Mechanism

The paper feed mechanism of this printer consists of the integrated ASF (Auto Sheet Feeder) mechanism, tractor mechanism, PF (Paper Feed) motor, front/rear PE (Paper End) sensors, PF roller, paper guide mechanism, paper eject unit, and PF motor drive disengage mechanism. The torque from the PF motor drives the paper load mechanism, paper feed mechanism and paper eject mechanism. While the printer is not printing, the PF motor drive disengage mechanism switches the torque from the PF motor to the pump mechanism, which depends on the CR position. While the paper feed mechanism is driven, the torque from the PF motor is transmitted via PF motor pinion gear and disengage gear to the PF roller., where the torque is then divided into 2 directions. One is transmitted to the paper eject mechanism via the gear train in the paper guide assembly. The other is transmitted to the ASF mechanism via the transmission gear.
The tractor drive gear train is set at the left end of the PF roller. Table 2-4 and Table 2-5 shows the specification for the PF motor and PF motor drive terms, respectively. Figure 2-5 illustrates the paper feed mechanism.

Table 2-4 PF Motor Specification

Item	Description
Motor type	4-phases / 96-pole / HB type stepping motor
Drive voltage	42 VDC ± 5% (The voltage applied to the driver)
Coil resistance	10 Ω ± 10% (at 25° C per 1 phase)
Connection	Bipolar
Excitation mode	2-2 phase, 1-2 phase, W1-2 phase constant current drive
Minimum step	1/720 inch / step (2-2 phase drive)

Table 2-5 PF Motor Drive Terms

Operation mode	Acceleration	Constant	Deceleration	Stand-by
Paper feed (Line feed:6/1 inch)	0.9/0.9	0.9	0.75/0.75	0.6
ASF Feed	0.9/0.9	0.9	0.75/0.75	0.6
Pump driven	— /0.9	0.9	0.9	0.6
Pump driven (slow)	— / —	0.9	— / —	0.6

Note) Double 1-2 phase drive / 2-2 phase drive

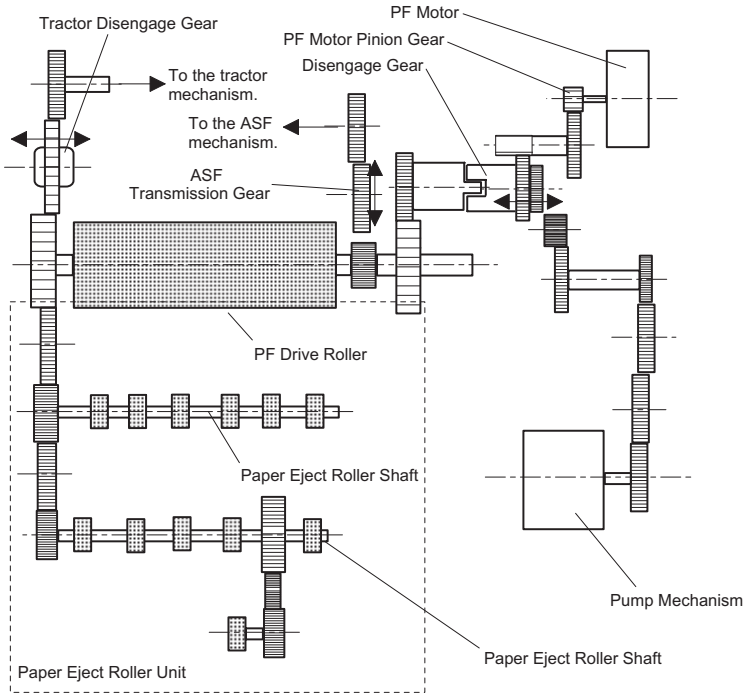


Figure 2-5. Paper Feeding Mechanism

2.2.4.1 ASF (Auto Sheet Feeder) Mechanism

Torque from the PF roller is transmitted to the pick up roller in the ASF mechanism via the planetary gear by the PF motor drive disengage mechanism which switches the torque based on the detected position of the CR unit. The pick up roller shaft has 2 arms on the right and left ends. The arms push down the paper support to make the paper surface contact with the pick up roller. The one way clutch rotates the puck up roller in the specified direction to load paper. The paper loaded is then fed by the paper feed mechanism and the gear transmission from the planetary gear is disengaged.

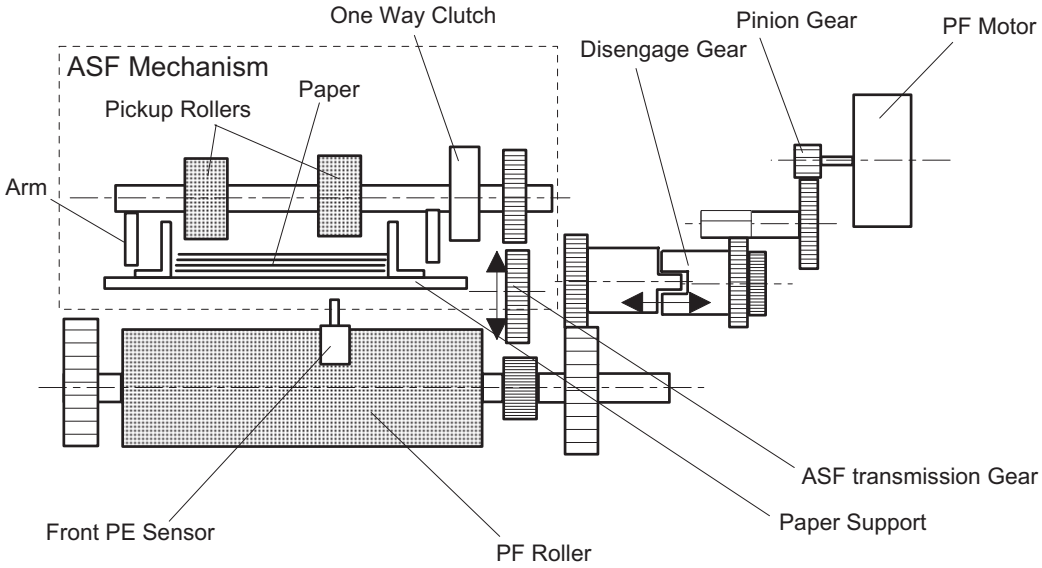


Figure 2-6. ASF Mechanism

2.2.4.2 Tractor Mechanism

Torque sent from the PF motor to the gears at the left end of the PF roller is transmitted to the tractor gears via disengage mechanism by the release lever operation. When the release lever is set to the tractor side, the release sensor detects the position and the torque from the ASF mechanism is disengaged consequently.

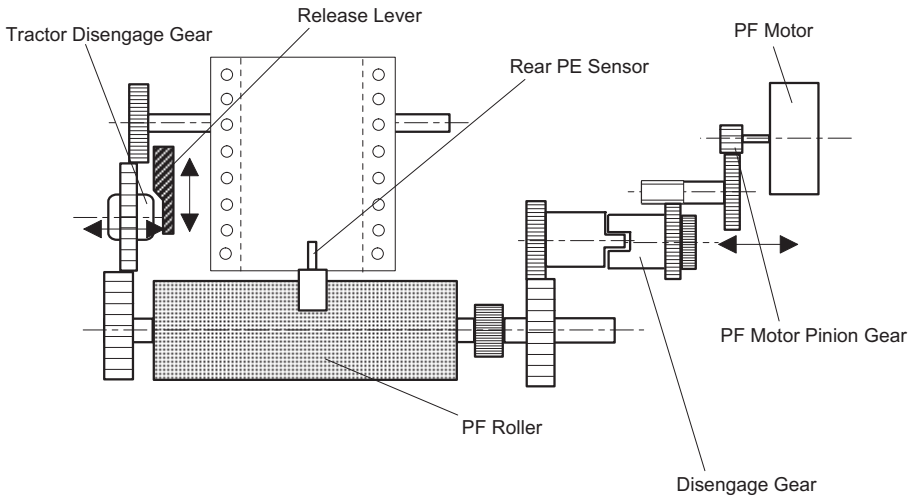


Figure 2-7. Tractor Mechanism

2.2.4.3 Manual Feed Mechanism

The printer loads cut sheet and roll paper at the rear paper slot. While paper is detected by the rear PE sensor, the CR unit is off the ASF paper feed position. Therefore paper is manually loaded even if there is paper in ASF. This mode allows the use of paper which is not set in ASF.

2.2.5 Platen Gap (PG) Adjust Mechanism

The PG adjust mechanism, located at the top right of the printer mechanism, allows the user to set the proper platen gap (distance between paper and nozzle surface) for the paper thickness to prevent ink smudging. The PF Adjustment mechanism consists of the PG adjust lever, CR guide shaft, and parallelism adjust bushings. Shifting the lever from “0” to “1” turns the CR guide shaft that joins to the lever. The joint for the parallelism adjust bushing and CR guide shaft has an eccentricity toward the guide shaft, which moves the guide shaft from or toward the platen. With this movement, the platen gap changes from wide to narrow or vice versa.

Table 2-6. Platen Adjust Lever positions

Paper Type	Adjust lever Position	PG Adjustment Value
Cut Sheet, OHP Sheet, Label, Continuous paper	Rear	0
Envelope ,Card, Index card	Front	+ 0.7 mm

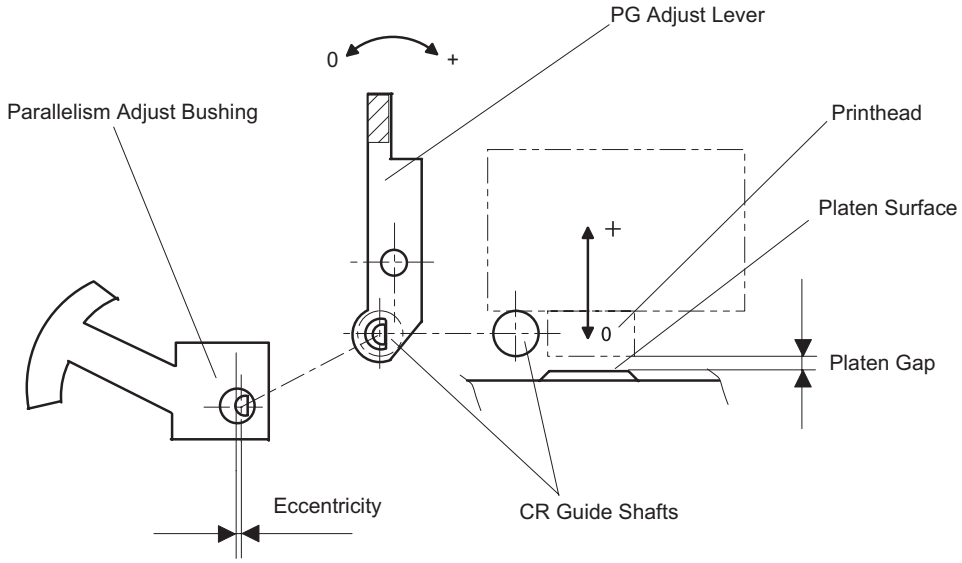


Figure 2-8. Platen Gap Adjustment Mechanism

2.2.6 Ink System

The ink system for this printer is composed of the following mechanisms.

- Ink cartridge
- Pump mechanism
- Capping mechanism
- Waste ink drain pads
- Wiping mechanism

Figure 2-9 shows the block chart of the ink system.

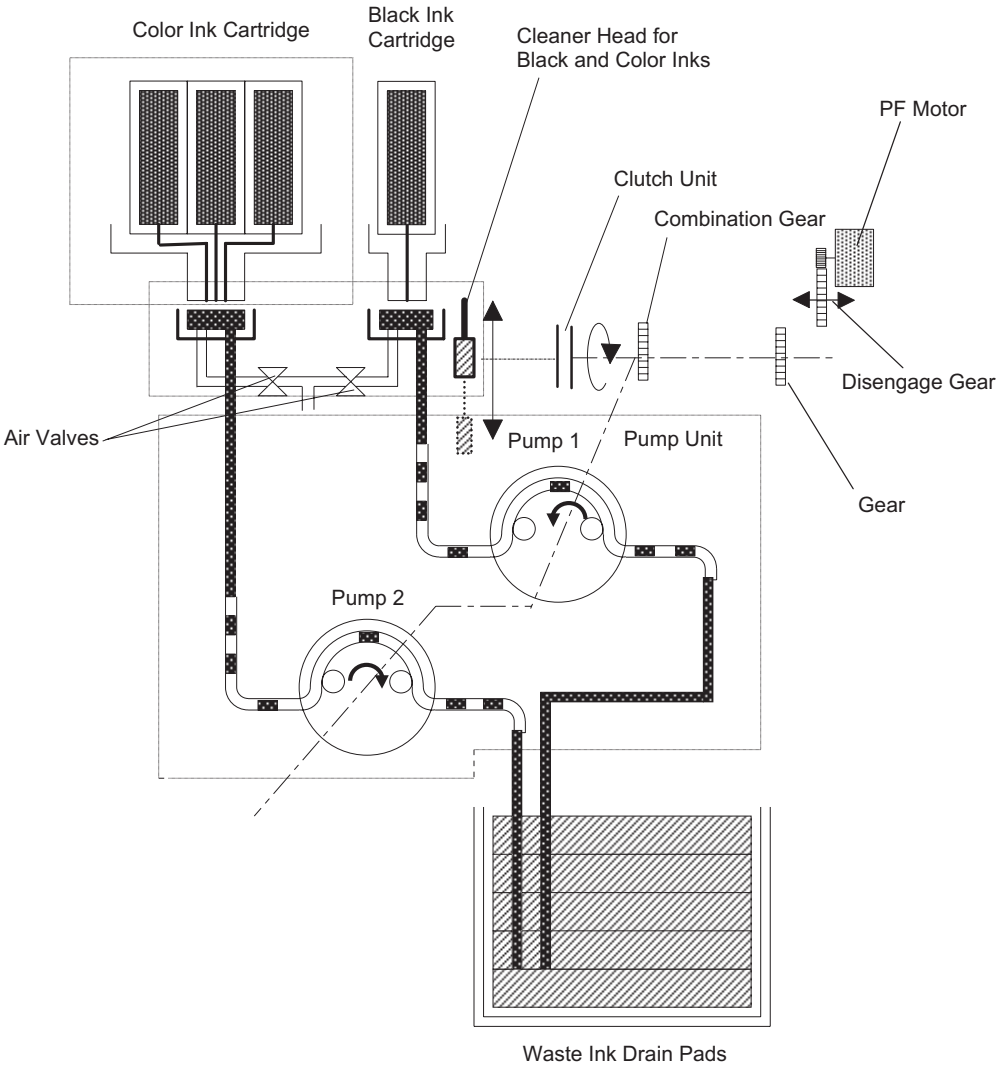


Figure 2-9. Ink System Mechanism

2.2.6.1 Pump Mechanism

1. Switching operation from the paper feed mechanism to the pump mechanism
   The PF motor also functions as the pump motor by the switching operation of the PF motor drive disengage mechanism. When the CR unit returns to the home position, the switch lever in the CR unit pushes the cam lever. Then the disengage gear switches the torque from the ASF to the pump mechanism via the gear train. Figure 2-11 illustrates how the torque is transmitted from the paper feed mechanism to the pump mechanism.

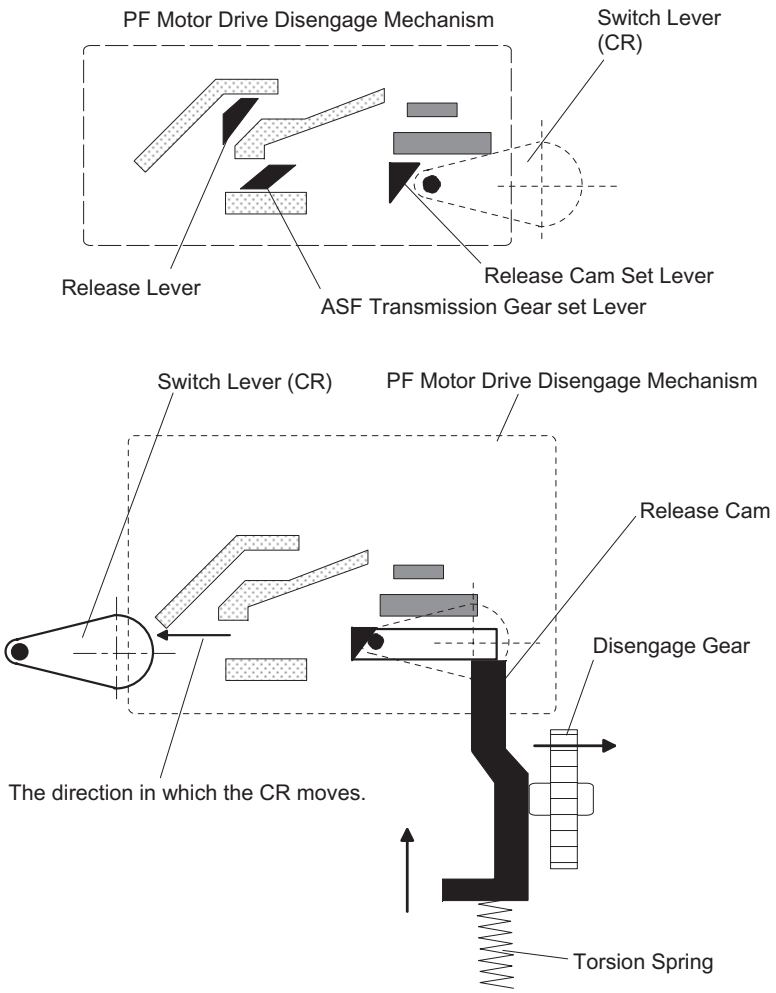


Figure 2-10. Release Cam Reset

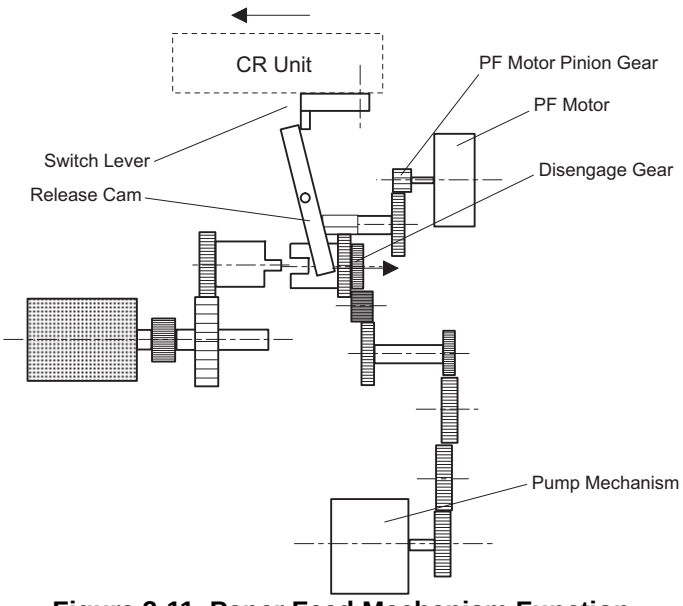


Figure 2-11. Paper Feed Mechanism Function

2. Switching operation from the pump mechanism to the paper feeding mechanism
   When the CR unit shifts from the right end to the left end, the switch lever in the CR unit pushes the cam release. Then the disengage gear switches the torque from the pump mechanism to the paper feed mechanism as a result. Figure 2-13 illustrates how the torque is transmitted from the pump mechanism to the paper feed mechanism.

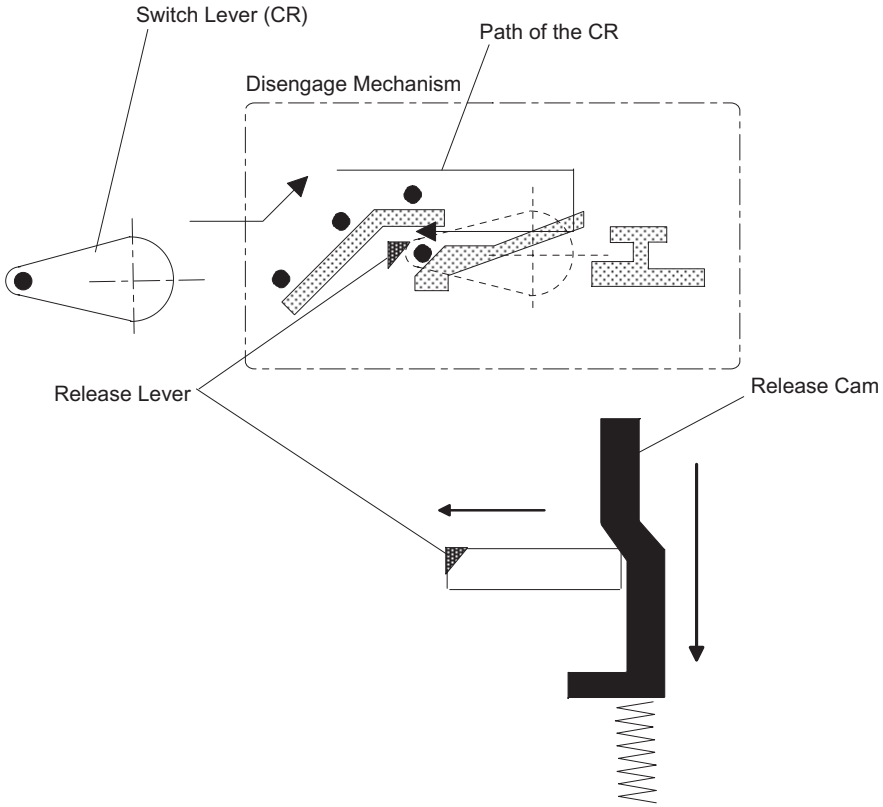


Figure 2-12. Release Cam Reset (2)

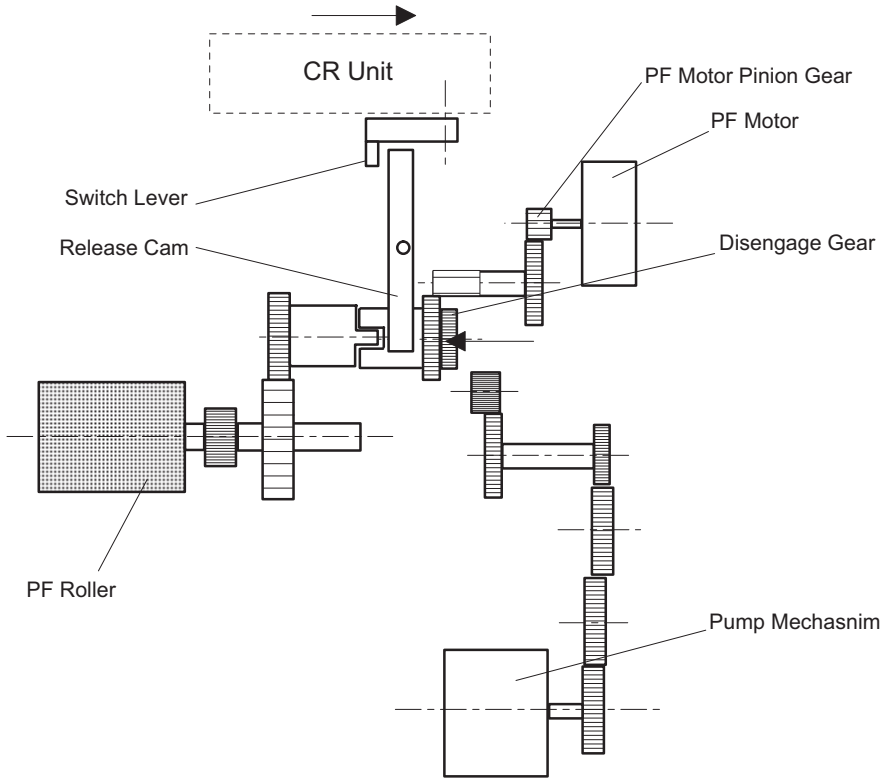


Figure 2-13. Paper Feed Mechanism Function (2)

3. Pump Mechanism Operation
   The pump mechanism absorbs ink inside the printhead and drains the ink to the waste ink drain pads via the cap. Since this printer has black and color heads, the pump mechanism functions for the both heads by alternating rotational directions of the PF motor. When the PF motor rotates forward (the direction for feeding paper), the pump is used for the black head. The PF motor rotates backward (the direction for feeding back paper) to use the pump for the color head. The pump mechanism is composed of the 2 rollers: tube, and pulley. To draw the ink, the pulley rotates the rollers squeezing the tube to produce the negative pressure, which absorbs the ink and drains it into the waste ink drain pad.

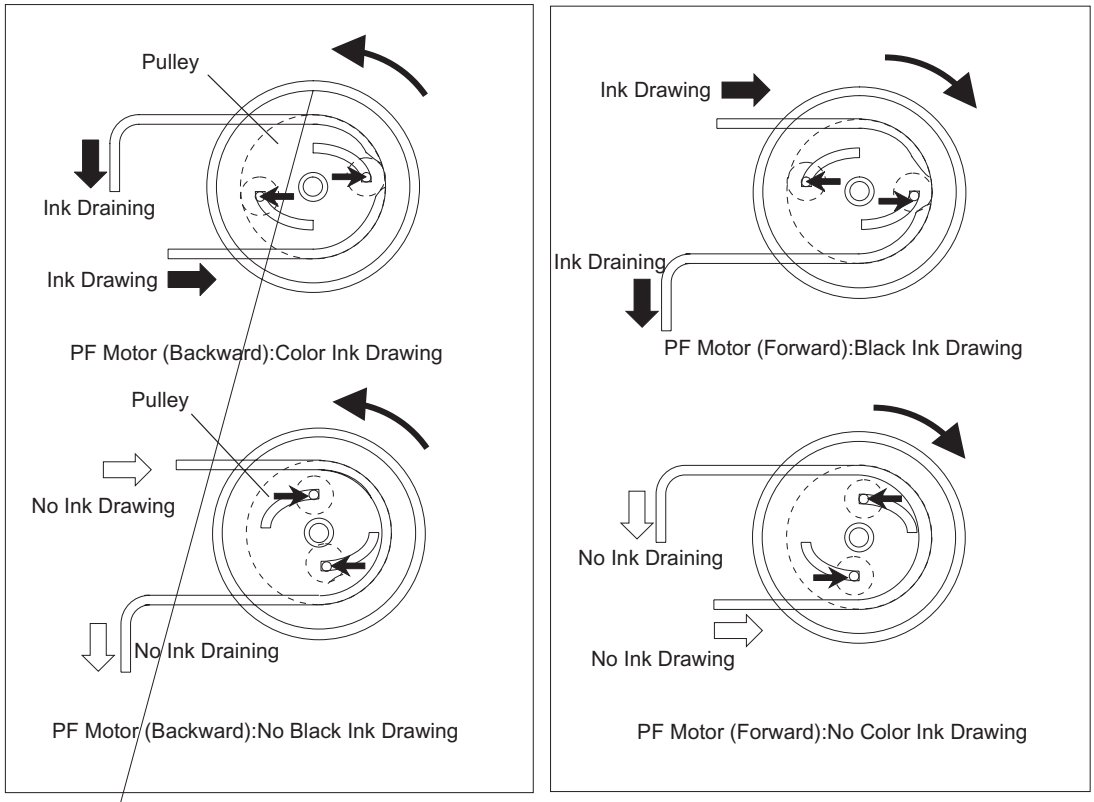


Figure 2-14. Pump Operation

2.2.7 Capping Mechanism

The capping mechanism caps the printheads with the cap holders to prevent the ink around the nozzles from increasing viscosity while the printer is in the stand-by status or the printer power is off. The cap is individually equipped for the black and color head. When the CR moves right from the home position, the cap holder also shifts right and strikes the right frame. This motion opens the air valve to release the air in the cap. To start printing operation, the CR moves right from the home position to strike the right frame with the cap holder so that the air valve opens. This operation brings the negative pressure in the cap back to normal and the CR goes back the home position. The power switch of this printer uses the secondary circuit that keeps the printer power on until the capping operation completes even if the printer is turned off during the operation.

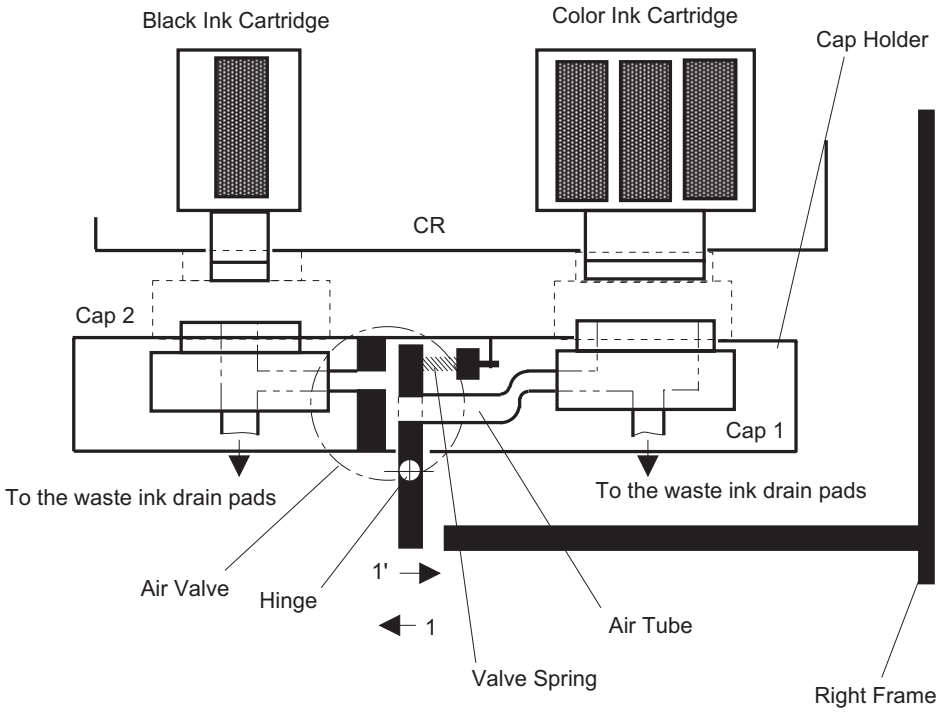
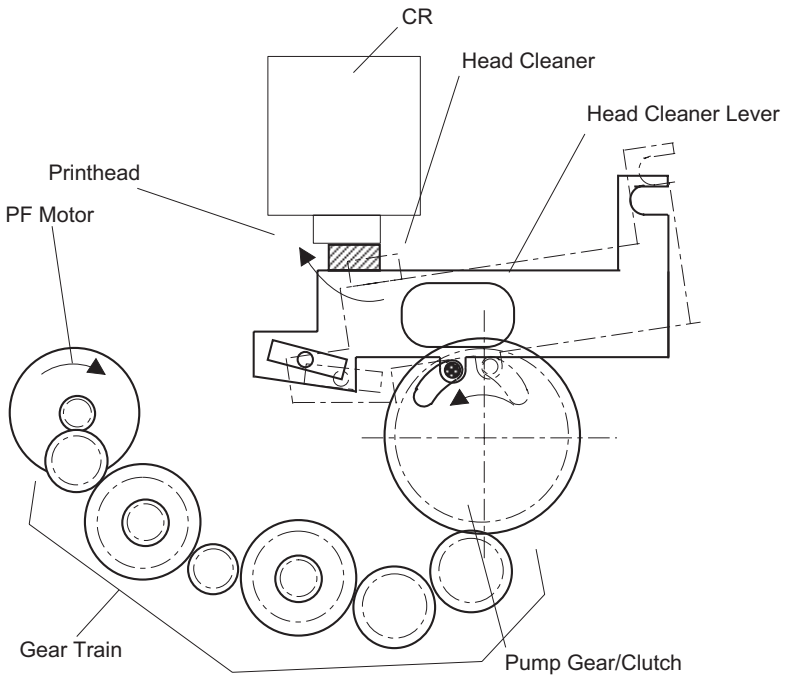


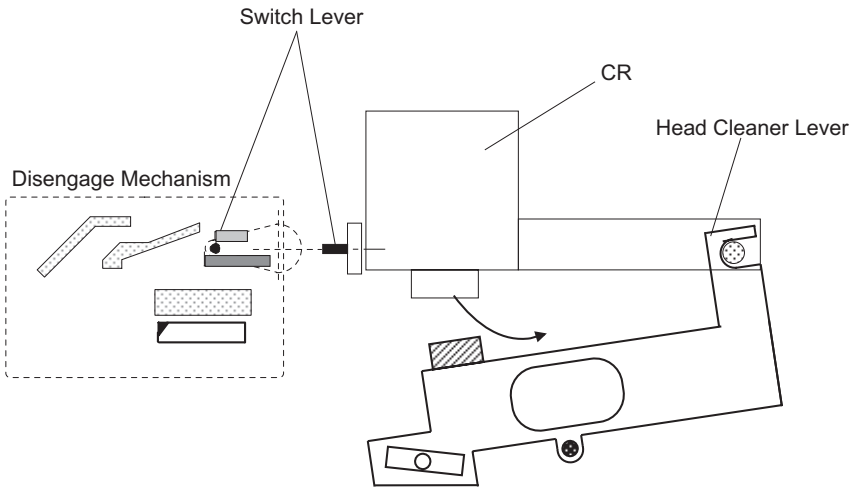
Figure 2-15. Capping Mechanism

2.2.7.1 Wiping/CR Lock Mechanism

The wiping mechanism removes the ink and dust adhered around the nozzles. This is operated during a cleaning sequence. When the PF motor rotates backward, the torque sent via the head cleaner (wiper) drive gear and the clutch moves the head cleaner to the path of the printhead. Then the CR unit moves right and left to wipe the nozzle surface against the head cleaner. The head cleaner leaves the path with the forward rotation of the PF motor. Only one cleaner head is used for both black and color heads. The head cleaner is substituted for the CR lock mechanism. When the printer power is off, it locks the CR unit off the printing side. The right frame also locks the CR at the right end. With this mechanism, the CR remains in the capping position while transported.



<Wiping Mechanism>



<CR Lock Mechanism>

Figure 2-16. Wiping/Carriage Lock Mechanism

2.3 Electrical Circuit Operation Principles

This printer consists of the following circuit board:

- C211 MAIN board
- C178 PSB/PSE board
- C211 Panel board

Head driver circuits (nozzle selection circuit) are directly attached to the black and color heads. Figure 2-17 shows the block diagram of the electrical circuit.

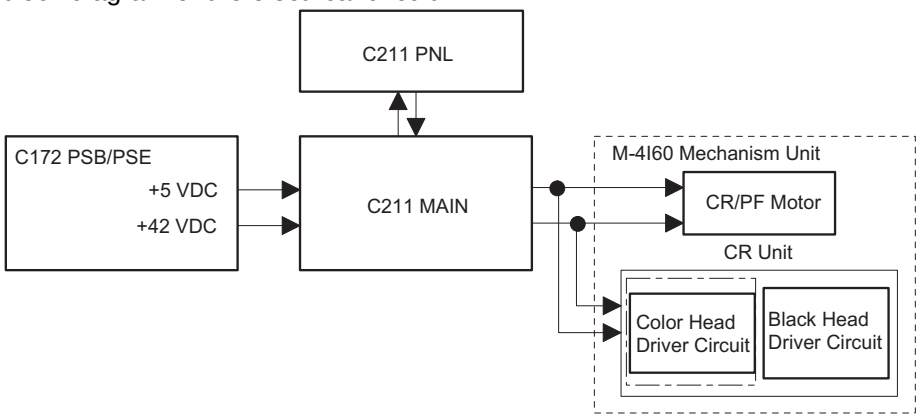


Figure 2-17. Electrical Circuit Block Diagram

2.3.1 C172 PSB/PSE Electrical Circuit Board

The input voltages for the PSB/PSE board are as shown in Table 2-7. Since the electrical circuit of this printer is in a secondary circuit, it accommodates the delay timer to make the printer execute the capping operation even though the printer is turned off during the operation. With this function, the printer can prevent the ink clogging or smudging caused by the exposed printhead.

Table 2-7. DC Voltage Distribution

VDC	Application
+42 V	❑ CR motor/PF motorMotors ❑ Printhead common voltage
+5 V	❑ C211 MAIN control board (logic) ❑ Sensors (HP sensor, PE sensor, ink cartridge sensor, DE sensor, cover open sensor) ❑ Control panel, Head nozzle selection

The electrical circuit of this board uses the RCC (Ringing Choke Converter) switching regulator. AC voltage is first input to the filter circuit for higher harmonics absorption and is then input to the rectification and smoothing circuit, converting into DC voltage. This DC voltage is then input to the switching circuit. Along with this switching operation by FET on the primary side, +42 voltage is generated and stabilized on the secondary side. The produced +42 voltage is then converted into the stable +5 VDC by the regulator IC. The CPU on the C211 MAIN board monitors the on/off signal of the power switch on the control panel. When the power goes off, the CPU sends the Power Off signal (PSC) to the electrical circuit. The electrical board has a delay circuit (ZD86, C82 and Q84) to delay the power off. The electrolytic capacitor, which control the delay period, continues to output +5 V and +42 V by keeping the main circuit switch on the primary side active until all electric charge is discharged. (The delay period is normally minimum 20 seconds, which depends on the capacitor size.)

Figure 2-18 illustrates the electrical circuit diagram.

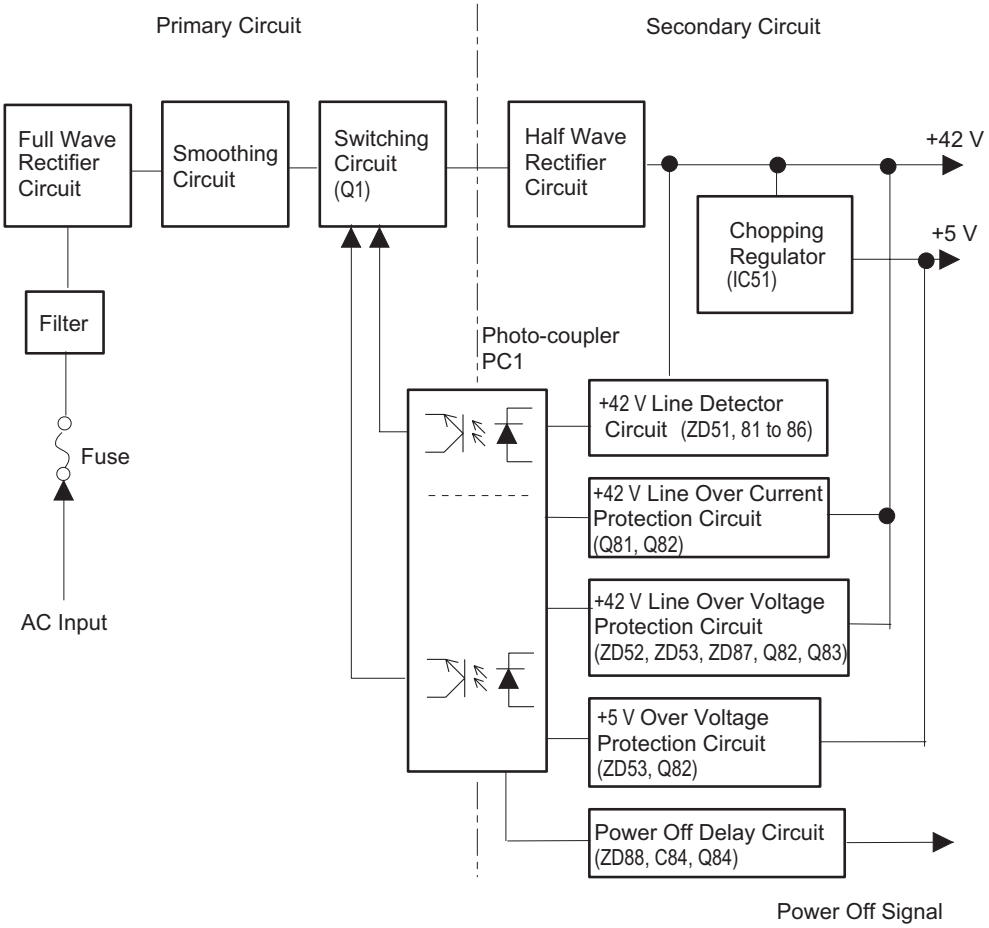

Primary Circuit
Secondary Circuit
Full Wave Rectifier Circuit
Smoothing Circuit
Switching Circuit (Q1)
Half Wave Rectifier Circuit
+42 V
Chopping Regulator (IC51)
+5 V
Filter
Photo-coupler PC1
+42 V Line Detector Circuit (ZD51, 81 to 86)
Fuse
+42 V Line Over Current Protection Circuit (Q81, Q82)
+42 V Line Over Voltage Protection Circuit (ZD52, ZD53, ZD87, Q82, Q83)
AC Input
+5 V Over Voltage Protection Circuit (ZD53, Q82)
Power Off Delay Circuit (ZD88, C84, Q84)
Power Off Signal

Figure 2-18. Power Supply Circuit Diagram

- +5 VDC line over voltage protection circuit
  The output voltage level of the 5 V line is monitored by a Zener diode (ZD53). If the voltage level exceeds 9 V, the status is fed back to the primary switching circuit through the transistor (Q82) and photocoupler (PC1) to cut the +42 V line to the regulator (OC51).
- +5 VDC line constant voltage control circuit
  Voltage at +5 VDC line is controlled by the regulator IC (IC51). When the abnormal voltage at +5 VDC line is detected, the status is input to the internal comparator of the regulator to control the voltage.
- +42 VDC line over voltage protection circuit
  The output level of the +42 VDC line is monitored by the 2 Zener diodes ZD52 and ZD87. When the output level of the +42 VDC line exceeds +48 V, the switching FET operation on the primary side is stopped via the thyristor (CY52), transistor (Q81) and photocoupler (PC21).
- +42 VDC line constant voltage control circuit
  Voltage at the +42 VDC line is monitored by the Zener diodes (ZD51, ZD81–ZD86). This circuit feeds back the output voltage level status through photocoupler (PC1) to the primary switching circuit to control the on/off time of the switching FET for constant output voltage.
- +42 VDC line overcurrent protection circuit
  The output current is monitored by the transistors Q81 and Q82. When the output current is abnormally low, the status is assumed to be a short circuit and the information is fed back to the primary circuit to stop the switching FET operation

2.3.2 C211 MAIN Control Board

This printer uses C211 MAIN for the main control circuit board. It consists of the following:

- 16-bit CPU C90A02CB (IC7) :Running at 19.66 MHz
- 2 gate arrays E05B33 (IC6) :Controls interfaces, motors and printheads.
  E05B34 (IC5)
- P-ROM, DRAM and MROM
- Drivers :Produces common voltage for the motors and printheads.

Table 2-8 and Figure 2-19 show the allocated functions for major components and the main control circuit block diagram, respectively.

Table 2-8. Location and function of the Major Components

IC	Location	Function
CPU	IC7	❑ 16-bit CPU ❑ Run at 19.66 MHz ❑ Controls the printer at the gate arrays IC5 and IC6 according to the program in P-ROM.
Gate Array	IC5	❑ Controls the I/F for the control panel. ❑ Controls the CR motor. ❑ Detects the signals from the PE sensor, cover open sensor and REL (Release) sensor.
Gate Array	IC6	❑ Controls the parallel I/F. ❑ Controls the serial I/F. ❑ Controls Type-B I/F. ❑ Controls the PF motor. ❑ Controls black and color heads. ❑ Controls the HP sensor and DE sensor.
DRAM	IC9	❑ Manages buffers, work area in the CPU, and stuck area.
DRAM	IC10	❑ For image buffer. Expansion
MROM	IC13	❑ 24 Mbit ❑ Manages C.G. (Character Generator).
P-ROM	IC11	❑ Equipped only for the European version.
P-ROM	IC14	❑ 8Mbit ❑ Printer control program ❑ Manages C.G. (Character Generator).
EEPROM	IC2	❑ Stores values for the default settings and other values.
Timer counter IC	IC3	❑ Manages timers for the ink system.
Common driver IC	IC18	❑ Produces common voltage for the black head.
Common driver IC	IC19	❑ Produces common voltage f or the color head.
Driver	IC16	❑ Drives the PF motor.
Driver	IC17	❑ Drives the CR motor.

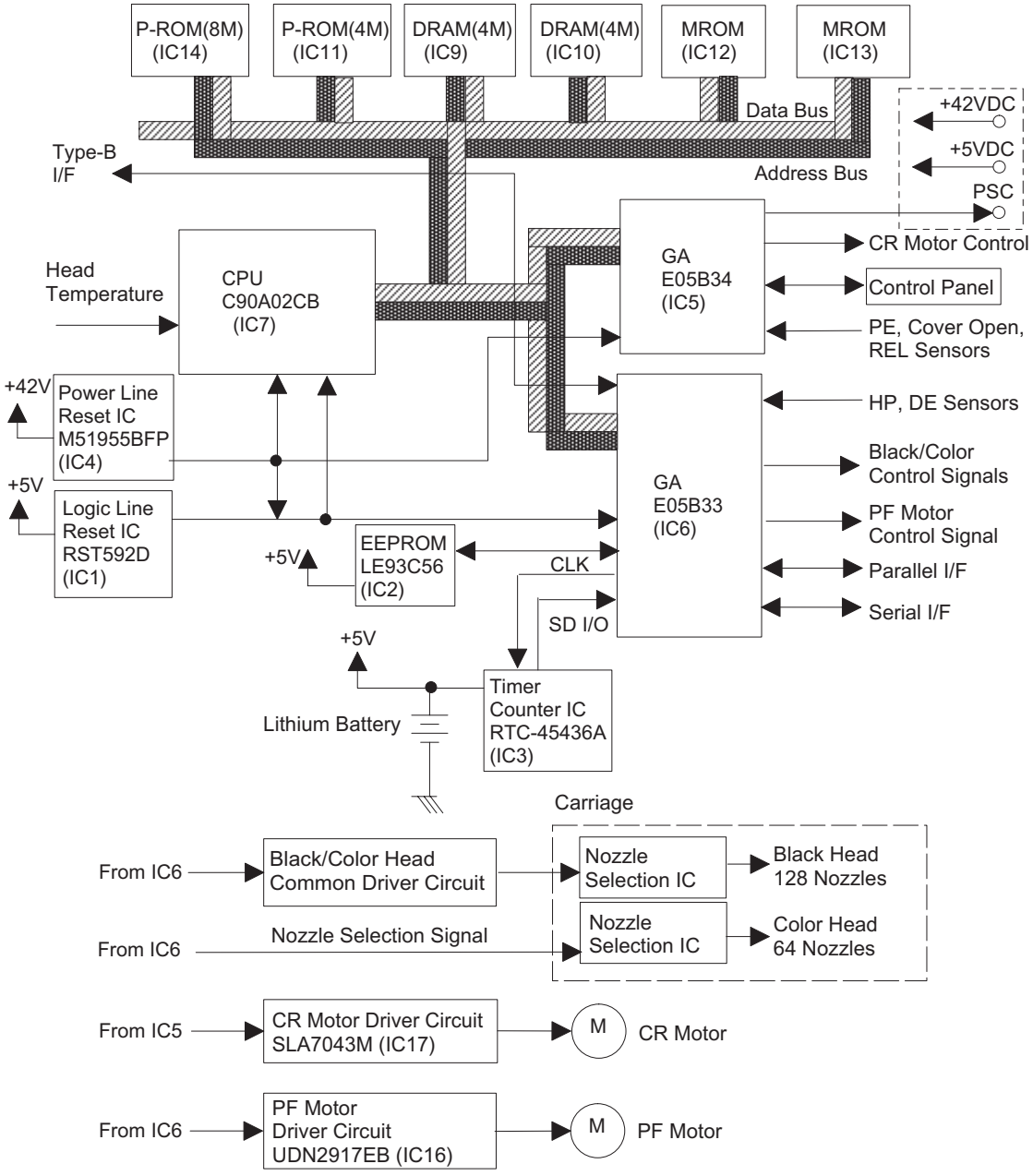


Figure 2-19. Control Circuit Block Diagram

2.3.2.1 Reset Circuits

The C211 MAIN board contains two reset circuits: logic line (+5 V) and power (+42 V) line. Reset IC M51955BFP (IC4) monitors the +42 V line. It outputs /NMI signal to the CPU and the gate array to cut off the power line for the motors when the voltage level drops below 33.2 V. Reset IC RST592D (IC1) monitors the +5 V line and sends low pulse when the voltage level drops below 42 V. During the printer power on, it outputs LOW until stabilized +5 V is produced to ensure the CPU's proper operation.

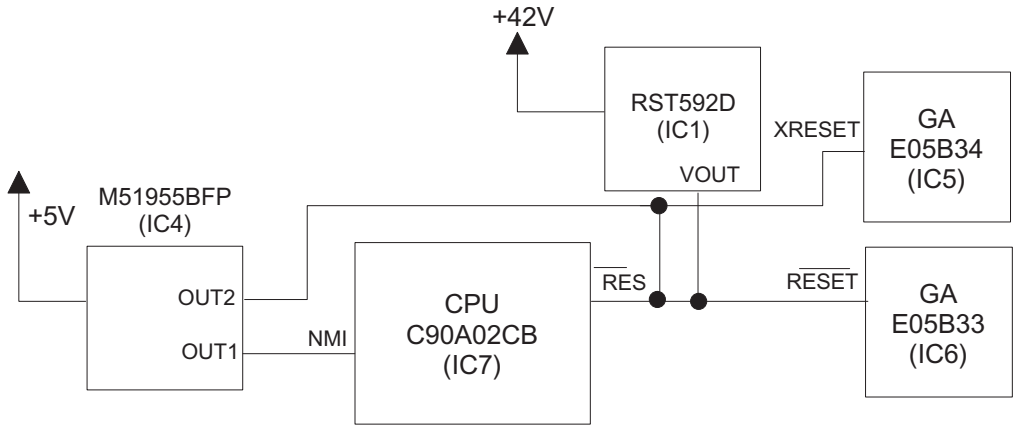


Figure 2-20. Reset Circuit Block Diagram

2.3.2.2 Sensor Circuits

This printer has 9 sensors to monitor the printer condition.

- HP Sensor (Home position sensor)
  The HP sensor for this printer uses the photo interrupter system. When the CR unit is at the home position, the signal goes low. A high signal level indicates that the CR unit is off the home position. The photo interrupted system is highly reliable because it has no contact with any mechanism.
- PE_R sensor (Rear Paper End sensor)
  The PE_R sensor, attached to the rear side of the paper path, detects the paper presence condition for continuous paper or cut sheet set in the rear side of the paper path. A mechanical switch used for this sensor opens when paper is fed and closes without any paper detected.
- PE_F sensor (Front Paper End sensor)
  This PE_F sensor, located in the paper guide unit, detects cut sheet presence condition in ASF. This sensor uses a mechanical switch which opens when paper is detected and closes with no paper detected.
- REL sensor (Release sensor)
  REL sensor is built into the rear part of the left frame in the printer mechanism. It determines whether the release lever is set to the cut sheet side (friction mode) or continuous paper side (tractor mode). A mechanical switch used for this sensor opens and closes when the lever is set for the friction mode and for the tractor mode, respectively.
- DE sensor (Disengage sensor)
  DE sensor built into the middle frame detects the CR position. A mechanical switch used for this sensor opens when the CR is at the pump side and it closes when the CR is at the paper feeding side.
- BCO sensor (Black ink cartridge sensor)
  BCO sensor, attached to the black ink cartridge holder in the CR unit, detects the black ink cartridge installation condition. A mechanical switch used for this sensor indicates Low when the cartridge is installed and goes High when the cartridge is not installed. When the sensor detects no cartridge condition, it resets the ink consumption counter.

- CCO sensor (Color ink cartridge sensor)
  CCO sensor, attached to the color ink cartridge holder in the CR unit, detects if the color ink cartridge is installed. A mechanical switch used for this sensor indicates Low with a cartridge installed and goes High without it. When the sensor detects no cartridge condition, it resets the ink consumption counter.
- Cover open sensor
  Cover open sensor, located at the right end of the printer mechanism unit, monitors the open/close status for the printer cover. A mechanical switch for this sensor opens when the cover is closed and closes when the cover is opened. When a cover open condition is detected, the printer sopts printing at the end of the line and returns the CR slowly to the CR lock position. When printing is commanded, the CR is left unlocked.
- Thermistor
  Thermistor is attached onto the color head to monitor the temperatures around the head. It is operated to avoid change in ink viscosity, which affects printing result. The signal output from the sensor is directly transmitted to the analog port of the CPU.

Figure 2-21 shows sensor circuit block diagram.

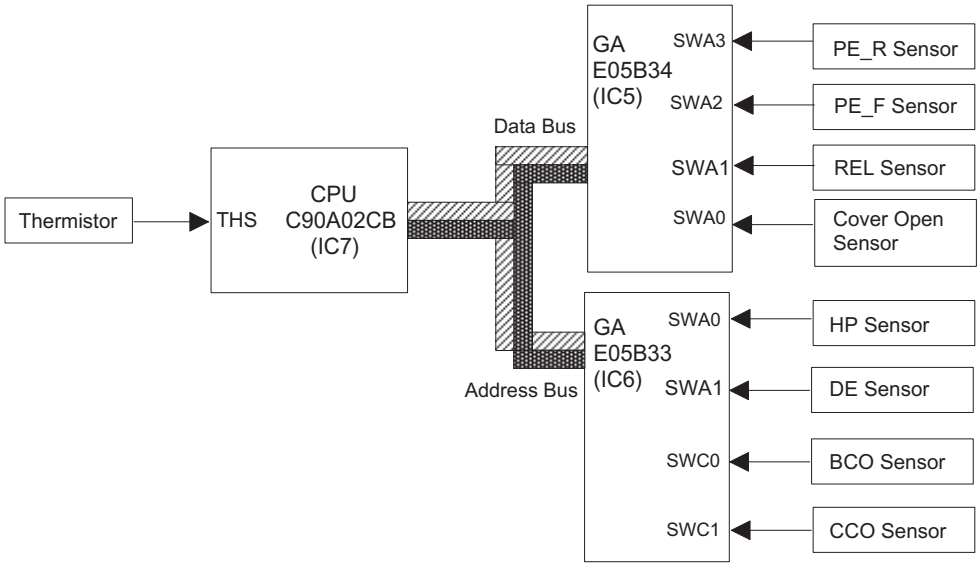


Figure 2-21. Sensor Circuit Block Diagram

2.3.2.3 CR Motor Driver Circuits

The CR motor driver IC SLA7043M (IC15) sends motor phase data using the serial data (XCRCLK, XCRSTB, CRASERI, CRBSERI) and voltage reference data (CRV) from the gate array E05B34 to the driver to control the phase current in the driver. The data output from the phase A and phase B (CRASERI, CRBSERI) are transferred synchronizing with the clock signal (XCRCLK). Then the data is read at the driver IC by the strobe signal (XCRSTB). This sequence enables the micro step with a minimum of 0.026 mm pulse driven at 2W1-2 phase excitation. The hold signal (CRHLD) also drives 2 phases to place the CR to the home position and to the cartridge change position. The Figure 2-22 shows the CR motor driver circuit block diagram.

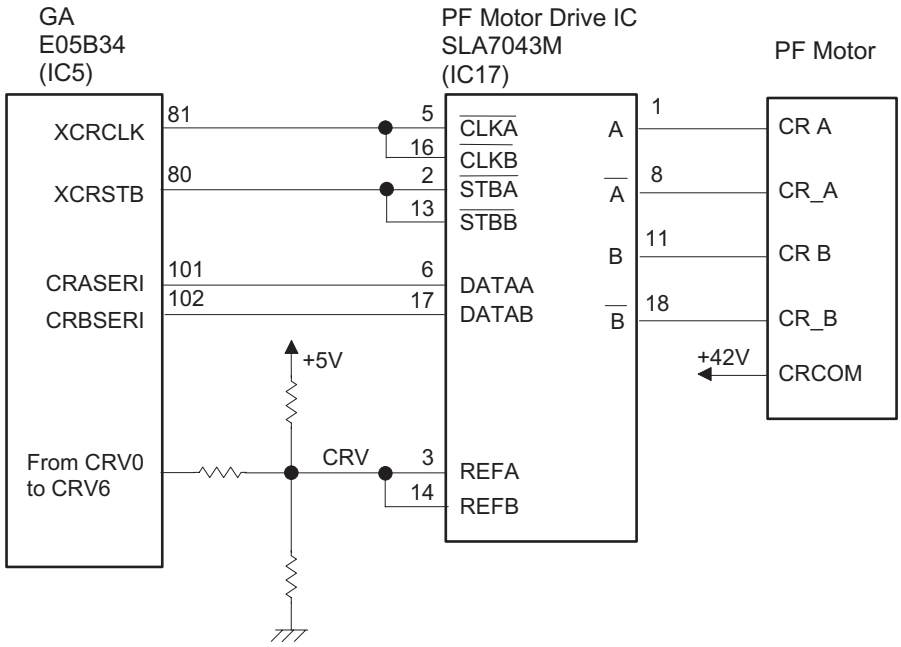


Figure 2-22. CR Motor Block Diagram

2.3.2.4 PF Motor Driver Circuit

The PF motor for this printer operates the following:

- Paper loading
- Paper feeding
- Pumping

The gate array E05B33 (IC6) outputs the phase drive control signals (PFAPH and PFBPH), phase data (PFA0/1 and PPFB1/0) and voltage reference data (PFV) to the driver IC UDN2917EB (IC16). The driver IC then controls the phase current based on the voltage reference data. This sequence enables the micro step with a minimum of 1/720 inch at 2-2 phase.

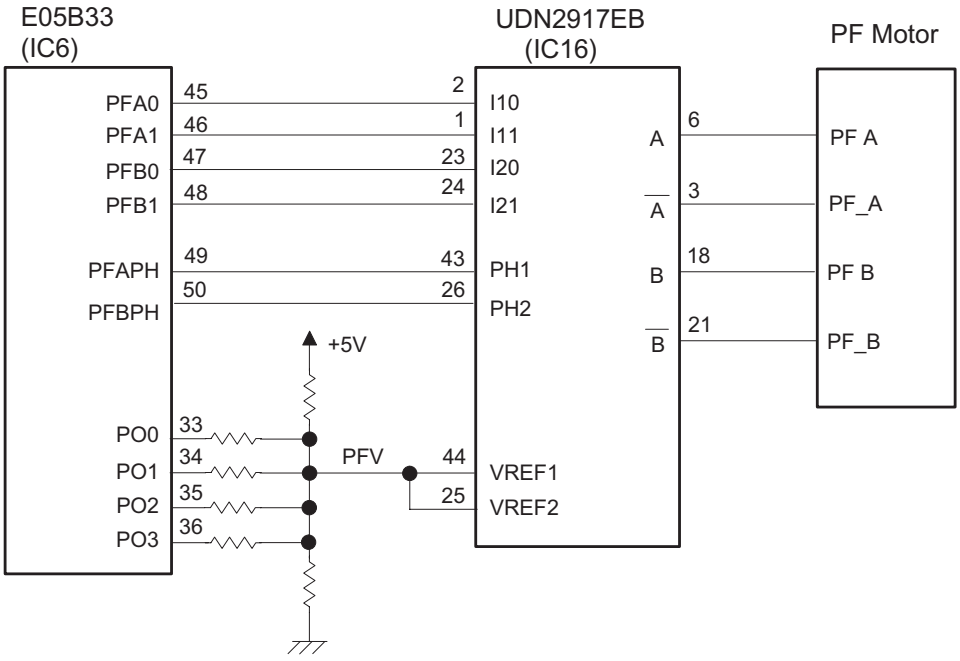


Figure 2-23. PF Motor Driver Circuit Block Diagram

2.3.2.5 Printhead Driver Circuit

This printer has 2 separate printhead driver circuits:for the black head and for the color head. Each circuit has the common voltage driver circuit attached to the MAIN board and the nozzle selection circuit attached to the head driver circuit board. The common driver circuits for the both black and color heads are composed of the hybrid ICs (IC19) and the terminal transistors. 128-bit transfer gate array IC IR2C72C is used for the black head nozzle selection circuit and 128-bit transfer gate array IC IR2C72C (for cyan and yellow) and 64-bit transfer gate array IC IR2C73C (for magenta) are used for the color head nozzle selection circuit. Printing data is separated into the common voltage signal and the nozzle selection signal at the gate array E05B33 (IC6) and is then transferred to the corresponding circuit. Figure 2-24 shows the printhead driver circuit block diagram.

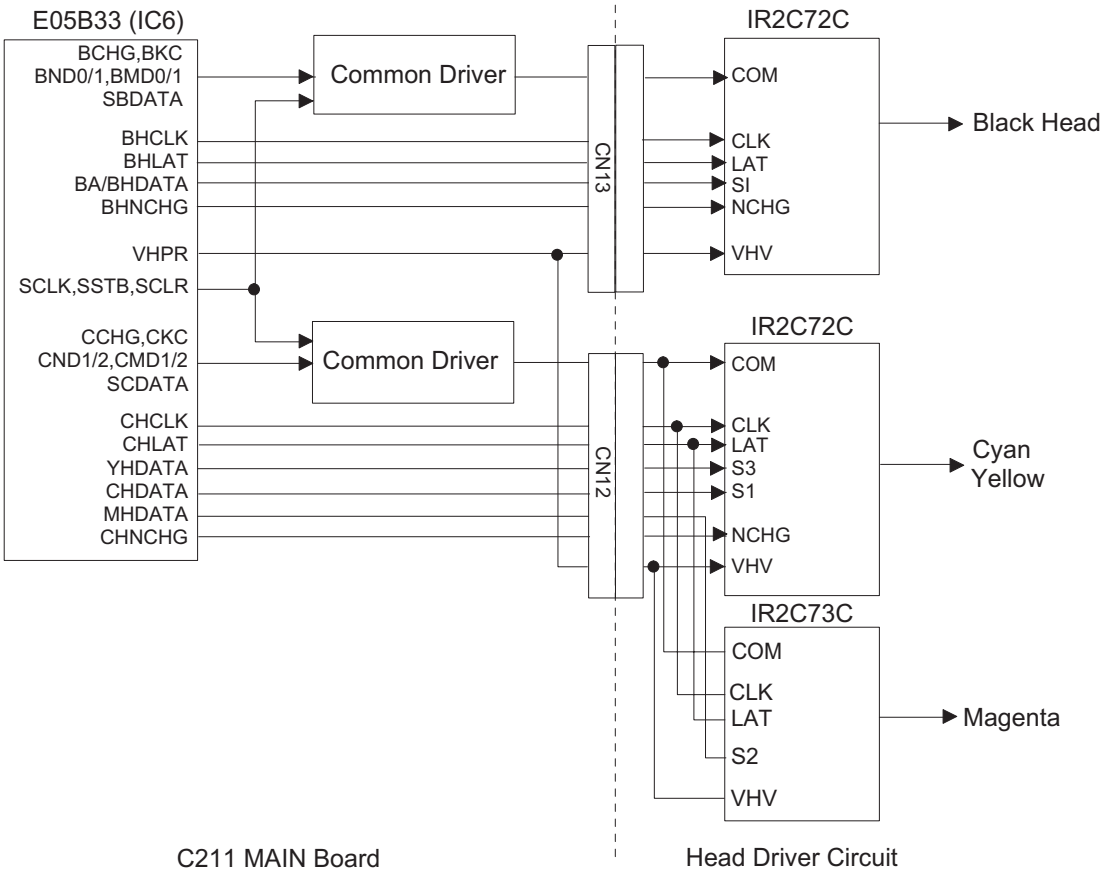


Figure 2-24. Prinrhead Driver Circuit Block Diagram

❑ **Common driver circuit for the black head**

Gate array E05B33 (IC6) sends serial data to the head nozzle selection circuit on the head to select nozzles to activate. Then the data is transferred to the common driver on the control board to drive all piezos that are corresponding to each nozzle. The operating principles for the black head is as follows:

- Nozzle selection circuit
  Nozzles for the black head are divided into 2 rows with 64 nozzles on each, and 2 deferent types of nozzle selection signal (BAHDATA and BBHDATA) are sent in serial data to the corresponding row. Clock signal (BHCLK) is composed of the pulses from #1 to #64. The nozzles to be activated is determined by the nozzle selection signal synchronized with the clock signal by the latch signal (BHLAT). However, the numbers used for the pulses and corresponding nozzles are not the same.
- Common driver circuit
  The common voltage (VH) is established to correspond to each of the black printhead characteristics. This value is stored in advance in the EEPROM when the printer power is off. At power on, the value is stored in the RAM. The gate array E05B33 (IC6) refers to the value for the common voltage when outputting the serial data SBDATA as the voltage control signals to the common driver circuit. The serial data transmission control signals (SCLK, SSTB and SCLR) are used for this operation. The thermistor controls the common voltage by outputting the signals to compensate for changes in ink viscosity.

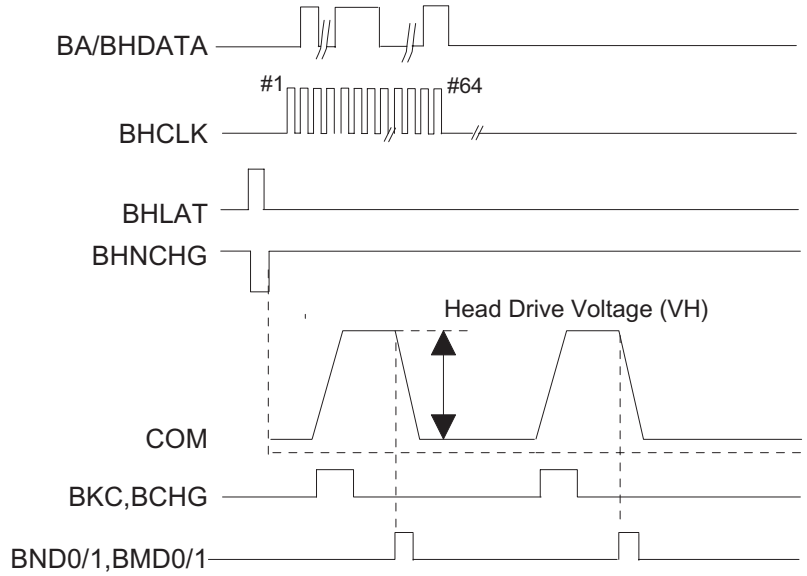


Figure 2-25. Black Data Transmission Timing

❑ **Color head nozzle selector circuit**

The operating principle for the color head is the same as for the black head except that color print is performed with data for 3 different colors: yellow, cyan, and magenta. The operating principle for the color head is as described below:

- Nozzle selection circuit
  The nozzles for the color head are divided into 3: for yellow, cyan, and magenta with 64 nozzles for each of them. The nozzle selection signals for each color (YHDATA for yellow, MHDATA for magenta and CHDATA for magenta) are sent simultaneously in serial data. The clock signal (CHCLK) is composed of the pulses from #1 to #64. The nozzle selection signal and the corresponding clock signal are synchronized by the latch signal (CHLAT) to determine the nozzle to use. However, the numbers used for the pulses and corresponding nozzles are not the same.
- Common driver circuit
  The common voltage (VH) is established to correspond to each of the black printhead characteristics. This value is stored in advance in the EEPROM when the printer power is off. At power on, the value is stored in the RAM. The gate array E05B33 (IC6) outputs the serial data SCDATA of the voltage control signals to the common driver circuit referring to this value. The control signals for the serial transmission SCLK, SSTB and SCLR are used for this operation. The thermistor controls the common voltage by outputting the signals to compensate for changes in ink viscosity.

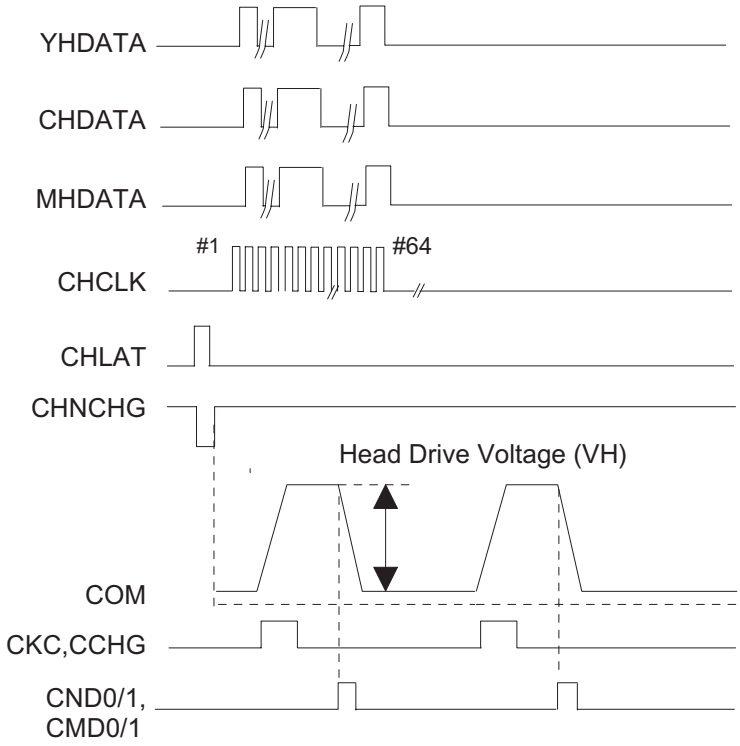


Figure 2-26. Color Data Transmission Timing

2.4 Ink System Management

This section explains how the ink system is controlled to protect the printheads and to ensure the output in high quality. The ink system consists of following operations:

- Power On
- Initialization
- Ink Cartridge Replacement
- Cleaning
- Print Start
- Flushing
- Waiting
- False Absorbing
- Wiping
- Rubbing
- Micro Absorbing
- Carriage Lock

The printer also selects an ink sequence based on the printer condition by referring to the value for the timer counter IC that has a back-up lithium battery and timer counter stored in the EEPROM. The printer has following counters:

- Protect Counter A
- Protect Counter C
- Ink Consumption Counter
- One-time Flag

2.4.1 Ink System Operations

The ink system operations are as described below.

- **Power on**
  Performed when the printer is turned on. It performs a cleaning sequence by referring to the counter value.
- **Initialization**
  Performed when the printer receives the initialization command. The CR returns to the home position during this operation.
- **Ink Cartridge Replacement**
  Performed through the control panel operation when the ink cartridge needs replacing. It determines whether the ink cartridge is installed and performs cleaning sequence if necessary.
- **Cleaning**
  Performed to solve decline in print quality caused by the abnormal nozzle status such as nozzle clogging and inaccurate ink ejection.
- **Print Start**
  Performs the cleaning or flushing operation before the printer starts printing after power on.
- **Flushing**
  Performed to eject few ink dots during printing to prevent ink from increasing viscosity.
- **Waiting**
  Performs the flushing operation after the printing operation to avoid nozzle clogging caused by the viscous ink.
- **False Absorbing**
  Absorbs the ink inside the cap and eliminates the ink on the nozzle plate after ink is absorbed.
- **Rubbing**
  Performed to eliminate the ink and dust that adheres on the nozzle surface. Few dots of ink is absorbed to moisten the nozzle surface prior to this operation.
- **Micro Absorbing**
  Performed to eject bubbles formed inside the cavity.
- **Carriage Lock**
  Locks the carriage when turning off the printer or no printing is performed for 5 minutes with the printer power on.

2.4.2 Counters

This printer is equipped with following counters. The values for the counters are stored in the EEPROM on the MAIN control board.

- **Protect Counter A**
  This counter is used to manage the total amount of drained ink. If the counter value exceeds 65,000, the maintenance error occurs and the current printing job stops consequently. (Refer to Section 1.4.11.) This error requires EEPROM clear and waste ink drain pad replacement. (Refer to Section 1.4.3 and Section 3.2.9.) The current value for this counter can be found in the default setting mode. (Refer to Section 1.4.5.) To reset the counter, perform EEPROM clear through the control panel operation or by running the adjusting program.
- **Protect Counter C**
  This counter is used to manage the amount of ink flushed at the left waste ink drain pad located at left end of the paper eject drive unit. The counter value corresponds to the ink amount accumulated in the pad. If the counter value exceeds the specified value, the maintenance error is indicated and the current printing job stops consequently. (Refer to Section 1.4.11.) With an occurrence of this error, the waste ink drain pads must be replaced. (Refer to Section 1.4.3 and Section 3.2.9.) the current value for this counter can be found in the default setting mode. (Refer to Section 1.4.5.)
- **Black/Color One-time Flag**
  This flag set in the EEPROM sets a limit to prevent user from performing frequent initial ink charge operation. Normally the initial ink charging is performed when the user starts using a new printer only. The flag is reset by the EEPROM clear operation through the control panel or adjusting program.
- **Ink Consumption Counter**
  This counter monitors the amount of ink used throughout the printing, cleaning, and flushing operations after a new cartridge is installed. The value is referred to determine the amount of ink remaining in the cartridge. This counter is reset when the cartridge is removed.

⚠ CAUTION

Be sure to replace the waste ink drain pads and the left ink pad when the EEPROM is cleared.(Refer to Chapter 3.)

Chapter 3
Disassembly and Assembly

3.1 Overview 3-1

3.1.1 Precautions for Disassembling the Printer 3-1

3.1.2 Tools 3-2

3.2 Disassembly and Assembly 3-3

3.2.1 Upper Housing Removal 3-4

3.2.2 ROM Replacement 3-6

3.2.3 Print Head Removal 3-7

3.2.3.1 Black Head Removal 3-7

3.2.3.2 Color Head Removal 3-8

3.2.4 Home Position (HP) Sensor Removal 3-9

3.2.5 Cover Open Sensor Removal 3-10

3.2.6 Printer Mechanism Unit Removal 3-11

3.2.7 PSB/PSE Board Assembly Removal 3-12

3.2.8 C211 MAIN Board Assembly Removal 3-13

3.2.9 Waste Ink Drain Pad Removal 3-15

3.2.9.1 Waste Ink Drain Pad Removal 3-15

3.2.9.2 Left Ink Pad Removal 3-15

3.2.10 Printer Mechanism Unit Disassembly 3-16

3.2.10.1 Carriage (CR) Motor Assembly Removal 3-16

3.2.10.2 PF (Paper Feed) Motor Assembly Removal 3-18

3.2.10.3 DE (Disengage) Sensor Removal 3-19

3.2.10.4 Front/Rear PE (Paper End) Sensor Removal 3-20

3.2.10.5 REL (Release) Sensor Removal 3-21

3.2.10.6 Edge Guide Unit Removal 3-22

3.2.10.7 Paper Eject Frame Removal 3-23

3.2.10.8 Pump Unit Removal 3-24

3.2.10.9 Carriage (CR) Unit Removal 3-25

3.2.10.10 Base Frame Assembly Removal 3-27

3.2.10.11 Paper Load Roller Unit Removal 3-28

3.2.10.12 Paper Feed (PF) Roller Removal 3-31

3.2.10.13 Rear Paper Guide Removal 3-32

3.2.10.14 Middle Frame Assembly Removal 3-33

3.1 Overview

This section describes procedures for disassembling the main components of EPSON Stylus COLOR 1520. Unless otherwise specified, disassembly units or components can be reassembled by reversing the disassembling procedure. Therefore, no assembly procedures are included in this section. Precautions for any disassembly or assembly procedure are described under the heading “WORK POINT”. Any adjustment required after disassembling the units are described under the heading “REQUIRED ADJUSTMENT”.

3.1.1 Precautions for Disassembling the Printer

See the precaution below when disassembling and assembling EPSON Stylus COLOR 1520.

⚠WARNING

- ☑ *Disconnect the power cable before disassembling and assembling the printer.*
- ☑ *Wear protective goggles to protect your eyes from ink. If ink gets in your eyes, flush the eye with fresh water and see a doctor immediately.*
- ☑ *If ink comes into contact with your skin, wash it off with soap and water. If irritation occurs, contact a physician.*
- ☑ *Be carefully not to get ink in your eyes. In case ink gets in your eyes, flush it with fresh water and see a doctor immediately.*
- ☑ *A lithium battery is installed on the main board of this printer. Be sure to observe the following instructions when servicing the battery:*
  - *Keep the battery away from any metal or other batteries so that electrodes of the opposite polarity do not come in contact with each other.*
  - *Do not heat the battery or put it neat fire.*
  - *Do not solder on any part of the battery. (Doing so may result in leakage of electrolyte from the battery , burning or explosion. the leakage may affect other device close to the battery.)*
  - *Do not charge the battery. (An explosive may be generated inside the battery, and cause burning or explosion.)*
  - *Do not dismantle the battery. (The gas inside the battery may hurt your throat. Leakage , burning or explosion may also be resulted.)*
  - *Do not install the battery in the wrong direction. (This may cause burning or explosion.)*

⚠CAUTION

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacture. Dispose the used battery according to government’s law and regulations.

⚠ATTENTION

Risqué d’explosion si la pile est remplacèe incorrectment. Ne remplacer pue par une pile du même type ou d’un type équivalent recommandé par le fabricant. Elimenir les piles déchargées selon les lois et les règles de sécurité en vigueur.

⚠CAUTION

- ☑ *Never remove the ink cartridge from the carriage unless manual specifies to do so.*
- ☑ *When transporting the printer after installing the ink cartridge, be sure to pack the printer for transportation without removing the ink cartridge.*
- ☑ *Use only recommended tools for disassembling, assembling or adjusting the printer.*
- ☑ *Apply lubricants and adhesives as specified. (See Chapter 6 for details.)*
- ☑ *Make the specified adjustments when you disassemble the printer. (See Chapter 4 for details.)*

3.1.2 Tools

Make sure you use the tools listed in the following table.

Table 3- 1. Tools

Tools	Distributor	Part No.
Phillips screwdriver no.1	EPSON	B743800400
Phillips screwdriver no.2	EPSON	B743800200
Standard screw driver	EPSON	B743000100
Nippers	EPSON	B740500100
Thickness Gauge	EPSON	B776702201
Tweezers	EPSON	B741000100

3.2 Disassembly and Assembly

This section describes disassembly and assembly procedures for the printer assemblies and parts. See the precautions in Section 3.1.1 when disassembling and assembling.

⚠ CAUTION

See the precautions in Section 3.1.1 prior to disassembly and assembly.

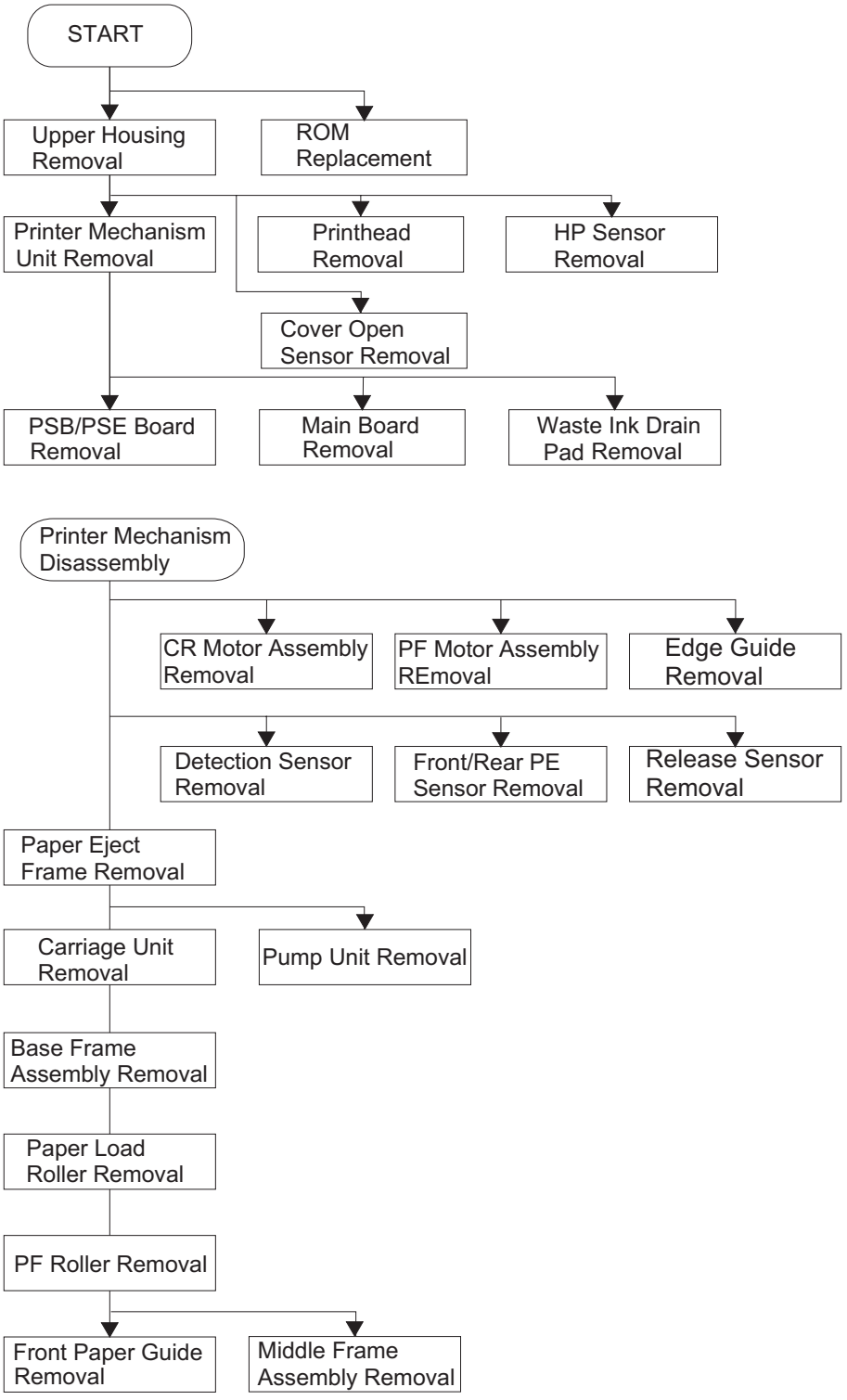


Figure 3-1. Disassembly Flowchart

3.2.1 Upper Housing Removal

1. Remove the knob, release lever, rear sheet guide, output tray, and paper support.
2. Remove the tractor unit by releasing the hook using the tweezers, then remove it from the printer mechanism unit by lifting up the rear edge of the tractor unit.

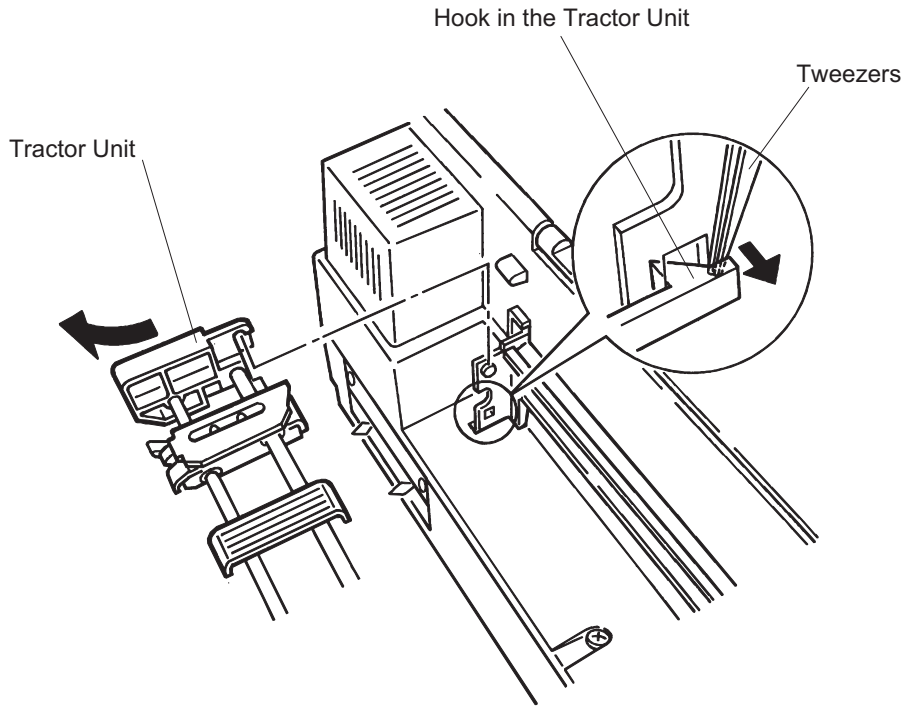


Figure 3-2. Tractor Unit Removal

3. Open the printer cover, and insert the tweezers into the cutouts at the back of the Panel Unit to release the hooks securing the panel unit to the upper housing. Then disconnect the connector cable for the Panel Unit and remove the Panel Unit.

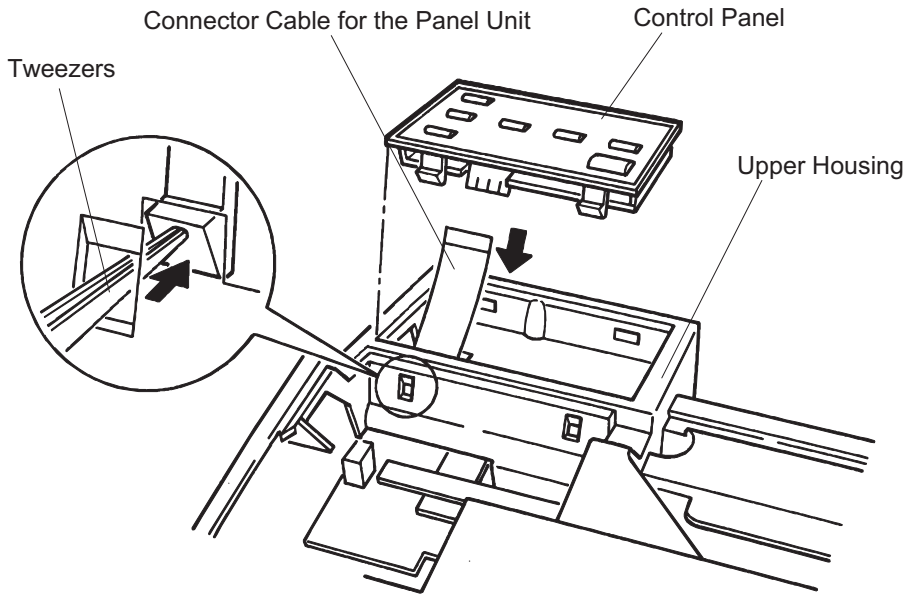


Figure 3-3. Panel Unit Removal

4. Remove 3 screws (CBB, 3X12) and 2 screws (CBB, 4X2) securing the upper housing to the lower housing.
5. Insert the tweezers into the cutouts at the bottom of the upper housing to release the hooks fixing the upper housing to the lower housing. Then remove the upper housing.

WORK POINT

☑ *After replacing the upper housing or printer cover, be sure to attach the label such as the CAUTION label to the specified position.*

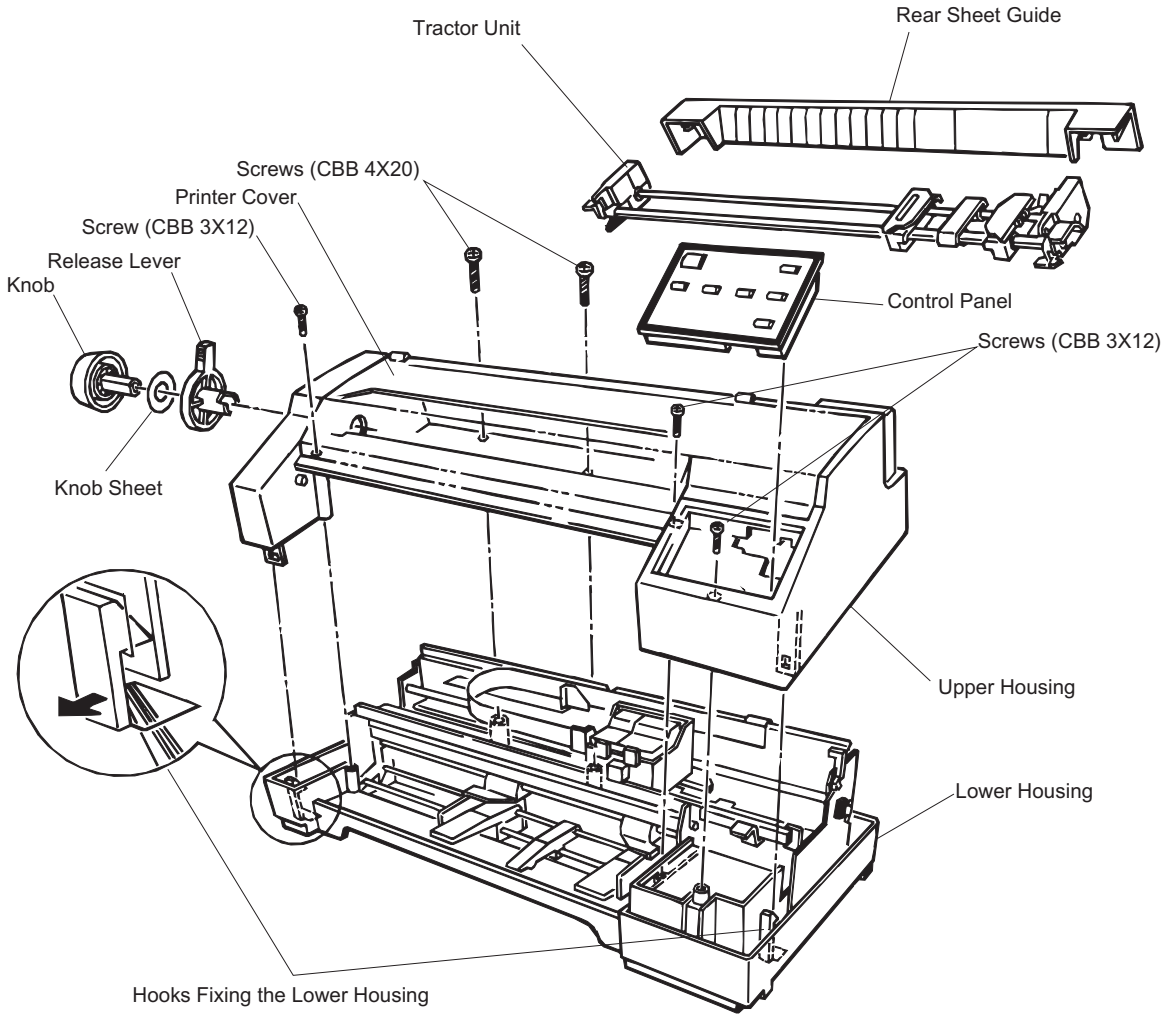


Figure 3-4. Upper Housing Removal

3.2.2 ROM Replacement

1. Remove 1 screw (CBP, 3X8) securing the ROM cover to the lower housing, and remove the ROM cover.
2. Remove the ROM.

⚠ CAUTION

☑ *Never replace the ROM before unplugging the power cable.*

3.2.3 Print Head Removal

3.2.3.1 Black Head Removal

1. Remove the upper housing. (Refer to Section 3.2.1.)
2. Remove the ink cartridge if it is installed.
3. Remove the FFC holders from the front left corner of the CR unit. Then release the FFCs by pulling them toward the printhead side.
4. Disconnect the black head FFC from the black head connector.
5. Remove the cartridge lever.
6. Remove the compression spring fixing the black head to the CR unit.
7. Remove the head fixing screw securing the black head to the CR unit.
8. Shift the black head forward then remove the black head by lifting it upward.

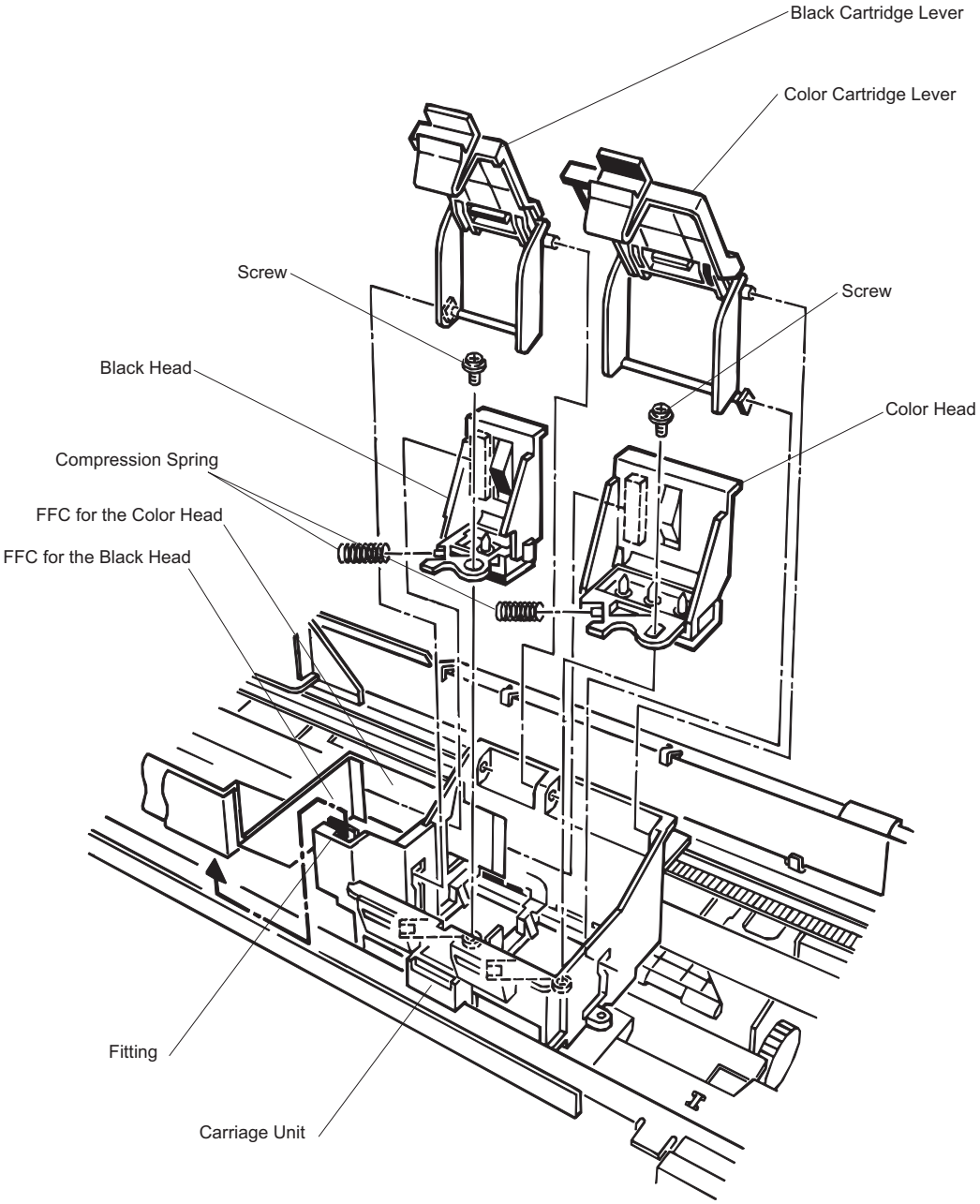


Figure 3-5. Black/Color Head Removal

3.2.3.2 Color Head Removal

1. Remove the upper housing. (Refer to Section 3.2.1.)
2. Remove the ink cartridge if it is installed.
3. Remove the FFC holders from the front left corner of the CR unit. Then release the FFCs by pulling them toward the printhead side.
4. Disconnect the color FFC from the color head connector.
5. Remove the Cartridge Lever.
6. Remove the compression spring fixing the black head to the CR unit.
7. Remove the screw securing the color head to the CR unit.
8. Shift the color head forward then remove it by lifting upward.

WORK POINT

☑ *When removing the black head, be careful not to catch the color head FFC.*

☑ *Be careful not to damage the Head FFCs when pulling them from the corner of the CR unit.*

REQUIRED ADJUSTMENT

☑ *After replacing the head, perform the following:*
(Refer to Chapter 4, Adjustment.)
- *Head data writing*
- *Head angle adjustment*
- *Head vertical adjustment*
- *Head gap adjustment*

3.2.4 Home Position (HP) Sensor Removal

1. Remove the upper housing. (Refer to Section 3.2.1.)
2. Disconnect the connector cable from the HP sensor connector.
3. Release the hooks fixing the HP sensor to the paper eject frame using the tweezers, then remove the HP sensor.

WORK POINT

☑ *After reassembling the HP sensor to the paper eject frame, be sure to fix the hooks to the frame using the specified adhesive. (Refer to Chapter 6.)*

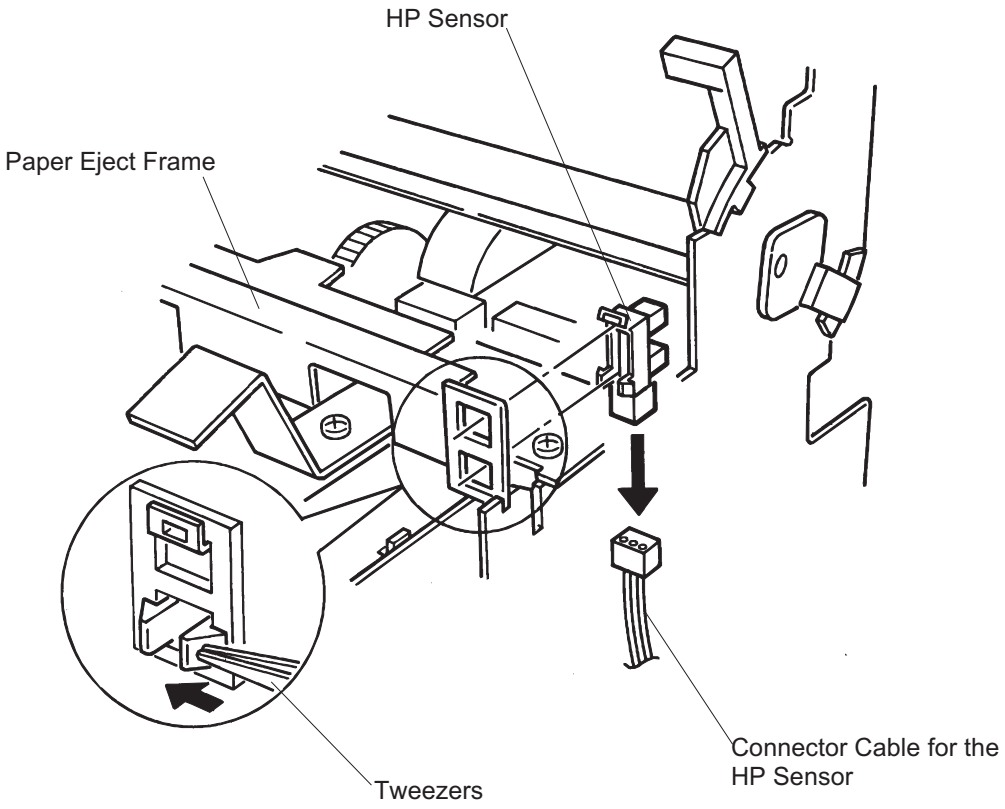


Figure 3-6. HP Sensor Removal

3.2.5 Cover Open Sensor Removal

1. Remove the upper housing. (Refer to Section 3.2.1.)
2. Disconnect the cover open sensor connector cable from the cover open sensor connector.
3. Release the hooks fixing the Cover Open Sensor to the paper eject frame using the tweezers then remove the Cover Open Sensor.

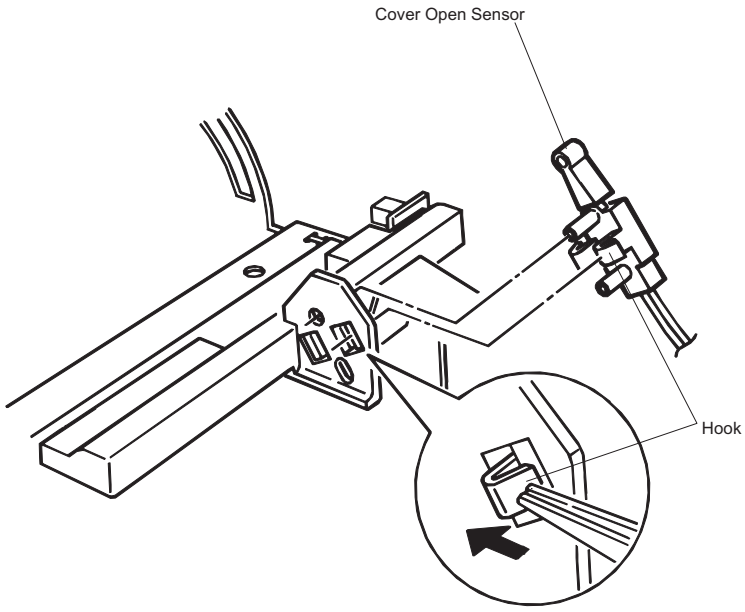


Figure 3-7. Cover Open Sensor Removal

3.2.6 Printer Mechanism Unit Removal

1. Remove the upper housing. (Refer to Section 3.2.1.)
2. Disconnect the connector cables from the connectors CN3, CN4, CN8, CN9, CN10, CN11, CN12, CN13, CN14, and CN15 on the C211 MAIN Board.
3. Remove 4 screws (CBB, 4X14) securing the printer mechanism unit to the lower housing.
4. Lift up the printer mechanism unit and remove it.

WORK POINT

☑ *Be sure to lubricate the front top edge of the paper eject frame after installing the ASP printer mechanism unit, which is not lubricated.*

REQUIRED ADJUSTMENT

☑ *After replacing the printer mechanism unit, perform the following: (Refer to Chapter 4.)*
- *Input the head data which is marked on the package.*
- *Bi-directional adjustment.*

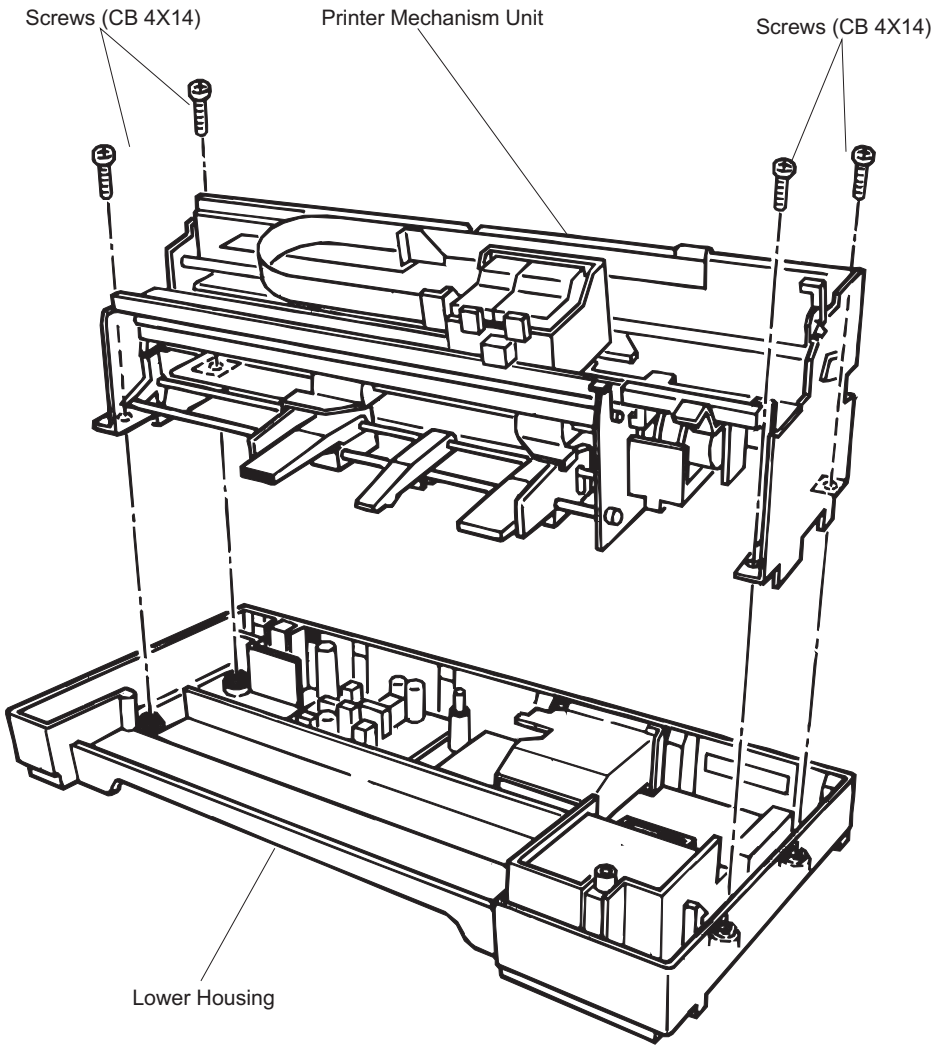


Figure 3-8. Printer Mechanism Removal

3.2.7 PSB/PSE Board Assembly Removal

1. Remove the upper housing. (Refer to Section 3.2.1.)
2. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
3. Disconnect the power cable connector from CN1, and the C211 MAIN board connector cable from the CN2.
4. Remove 4 screws (CBP, 3X12) securing the PSB/PSE Board to the lower housing, and remove the PSB/PSE Board.

⚠ WARNING

☑ *Make sure that the AC power cable is unplugged before disconnecting the power cable connector.*

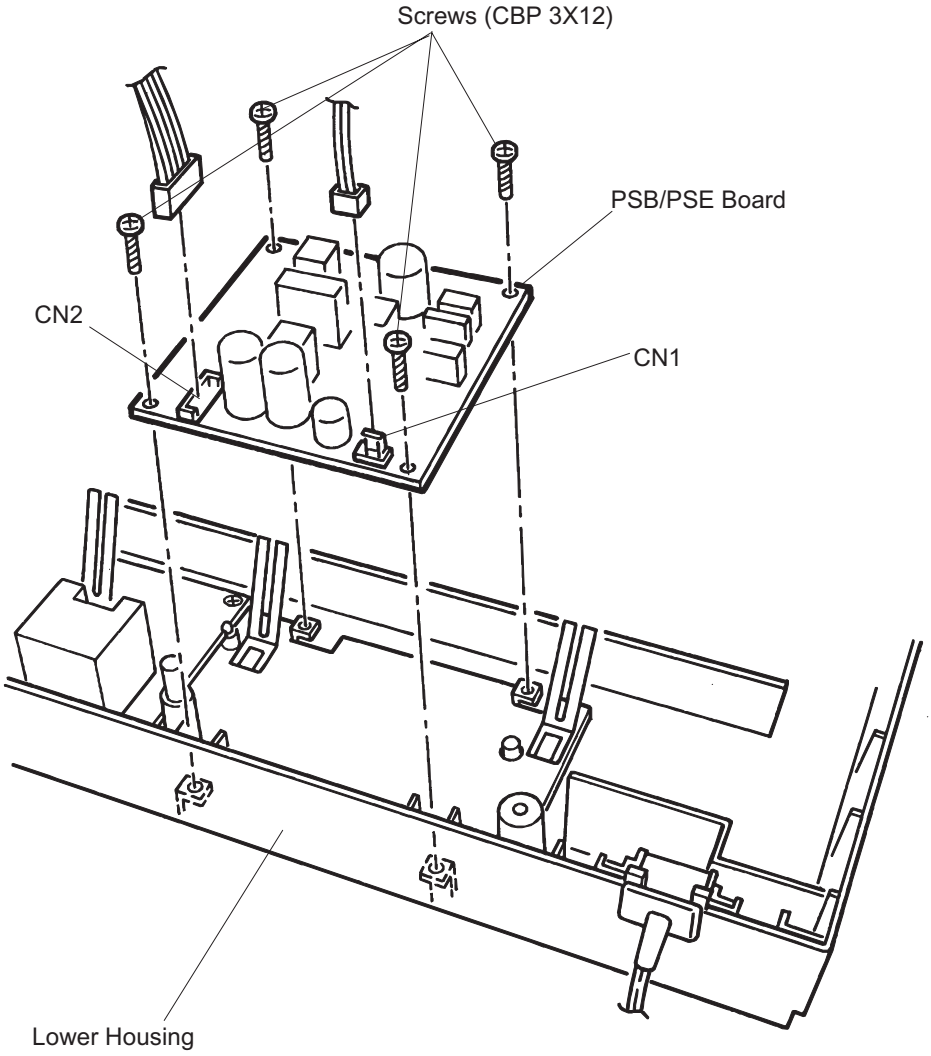


Figure 3-9. PSB/PSE Board Removal

3.2.8 C211 MAIN Board Assembly Removal

1. Remove the upper housing. (Refer to Section 3.2.1.)
2. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
3. Disconnect the connector cable for the PSB/PSE board from CN2, and the Control Panel FFC from CN7.
4. Remove 7 screws (CBP, 3X12) and 2 screws (CBS, M3X6) securing the C211 MAIN board assembly to the lower housing. Then remove the C211 MAIN board assembly, along with the Type-B interface shield cover.
5. Remove 2 screws (CP, M3X6) securing the Type-B interface shield cover to the C211 MAIN board. Then remove the shield cover.

REQUIRED ADJUSTMENT

☑ *When the C211 MAIN board is replaced, be sure to reset the EEPROM prior to adjustments to avoid a failure such as bugged data.*

⚠ WARNING

☑ *Be careful when servicing the lithium Battery. (Refer to Section 3.1.1.)*

☑ *Pay attention to the sharp edges of the shield cover.*

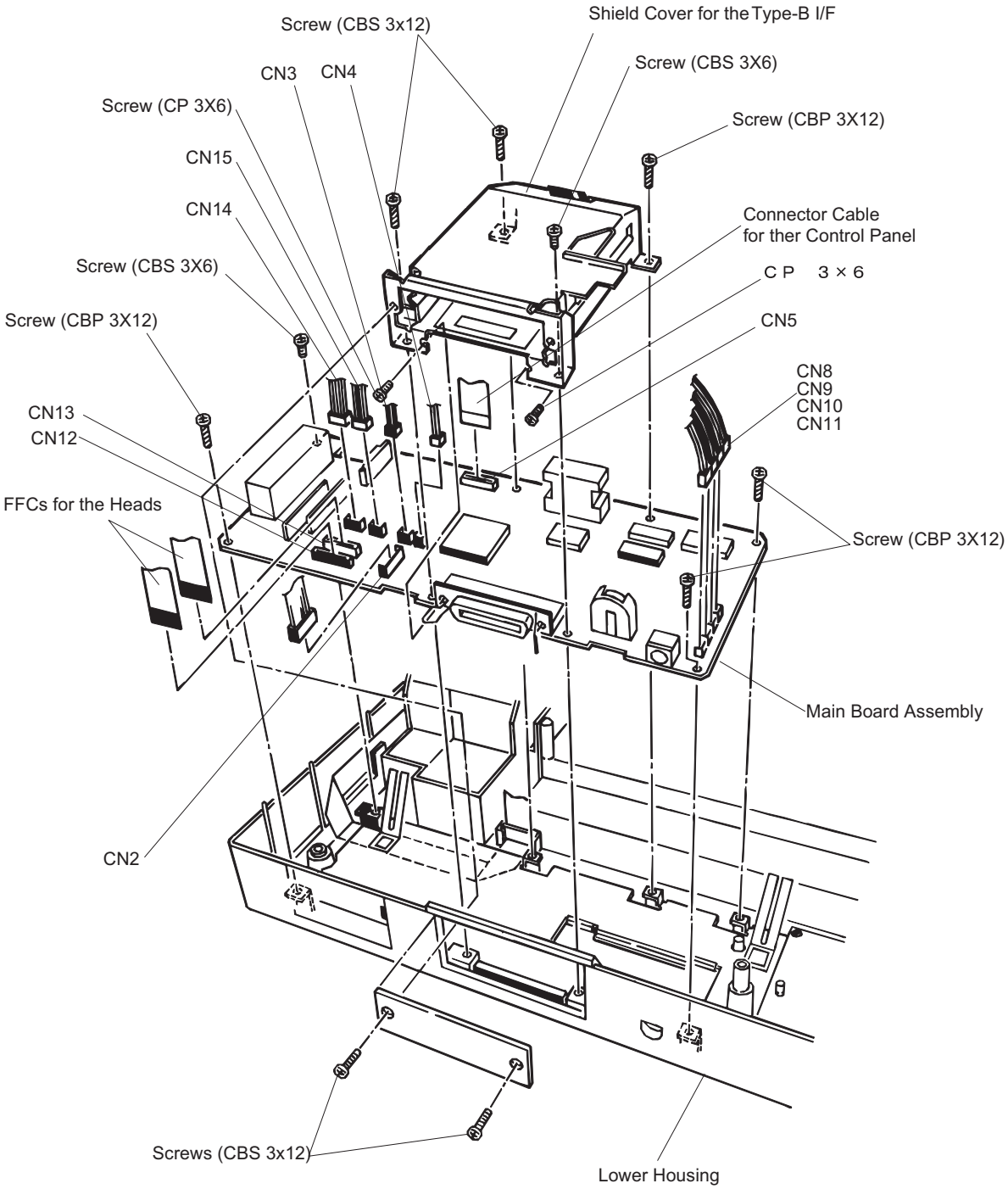


Figure 3-10. C202 MAIN Board Removal

3.2.9 Waste Ink Drain Pad Removal

Waste Ink Drain Pads must be replaced when the printer is under the following conditions:

- The value for the protect counter A has reached the specified value (65,000) and the maintenance request error is indicated.
- The indicated value of the Protect counter is more than 52,000. (In this case, be sure to replace them by agreement with your customer.
- The protect counter C has reached the specified value and the maintenance request error for the left ink pad is indicated.)

(Refer to Section 1.4.11 and Section 2.4.2.2.)

3.2.9.1 Waste Ink Drain Pad Removal

1. Reset the EEPROM. (Refer to Section 1.4.2.)
2. Remove the upper housing. (Refer to Section 3.2.1.)
3. Remove the printer mechanism. (Refer to Section 3.2.6.)
4. Remove the waste ink pads.

3.2.9.2 Left Ink Pad Removal

1. Reset the EEPROM. (Refer to Section 1.4.2.)
2. Remove the upper housing. (Refer to Section 3.2.1.)
3. Remove the ink pad cover on the left end of the paper eject drive unit.
4. Remove the left ink pad.

WORK POINT

☑ *Protect counter value is indicated on the first line of the first page of the default setting sample print, along with the ROM version number.*

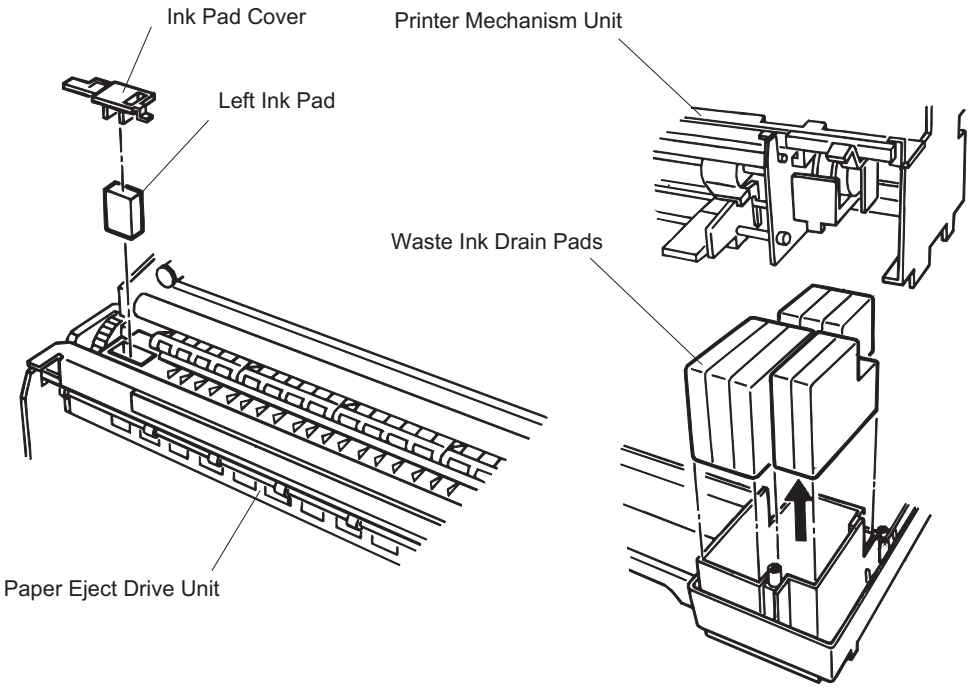


Figure 3-11. Ink Drain Pad Removal

3.2.10 Printer Mechanism Unit Disassembly

This section describes how to disassemble and reassemble the units and parts in the M-4160 printer mechanism.

3.2.10.1 Carriage (CR) Motor Assembly Removal

1. Remove the printer mechanism unit. (Refer to 3.2.6.)
2. Release the timing belt by removing the extension spring.
3. Disengage the timing belt from the pulley on the CR motor assembly.
4. Turn the CR motor assembly counter clock wise in the order indicated with arrows to disengage the joint with the base frame assembly. Then remove the CR motor assembly by moving it toward the bottom edge of the motor frame.

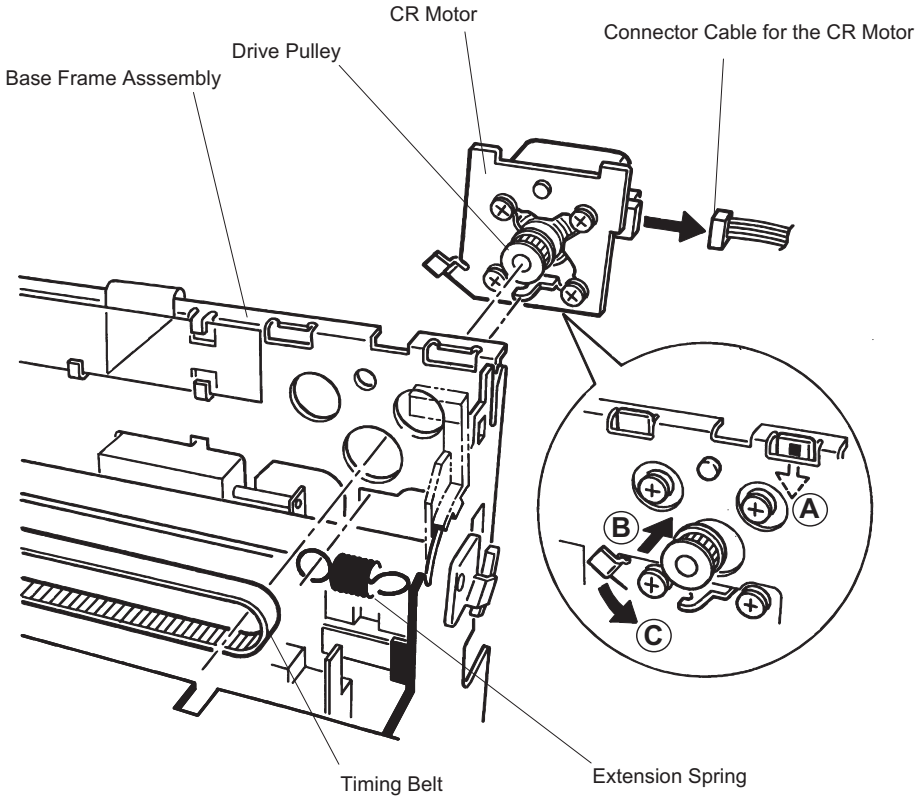


Figure 3-12. CR Motor Assembly Removal

5. Disconnect the CR motor assembly connector cable from the connector on the CR motor assembly.

WORK POINT

☑ *When mounting the CR motor, make sure that the connector cable for the DE (disengage) sensor doesn't cut in.*

☑ *CR fan motor and the CR motor assembly are 2 different parts. Therefore be sure to attach the CR fan motor when replacing the CR motor assembly. Use the specified adhesive to attach the fan to the motor shaft. (Refer to Chapter 6.) Note the following when attaching the fan:*
■ *Do not insert the fan more than 1 mm from the shaft end.*
■ *Set the fan with the indented side facing outward.*
(Refer to Chapter 6.)

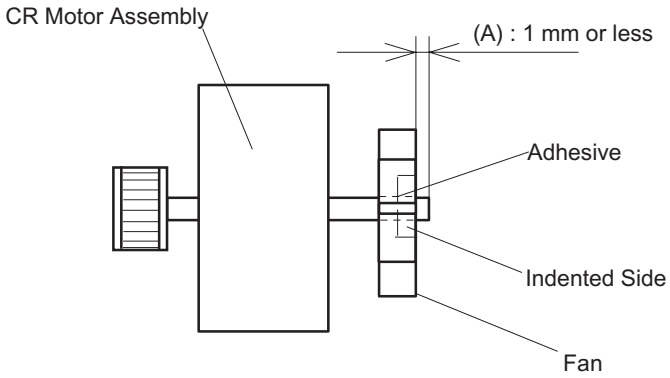


Figure 3-13. Fixing the CR Motor Fan

3.2.10.2 PF (Paper Feed) Motor Assembly Removal

1. Remove the printer mechanism unit. (Refer to 3.2.6.)
2. Remove the connector cable for the PF motor assembly from the connector cable clump on the printer mechanism unit.
3. Remove 2 hexagon nuts securing the PF motor assembly to the middle frame using a spanner, then remove the PF motor assembly.

WORK POINT

☑ *The pinion gear on the PF Motor Assembly is highly precise and tends to rust easily. Therefore do not touch it with your bare hand, or hit it with other objects.*

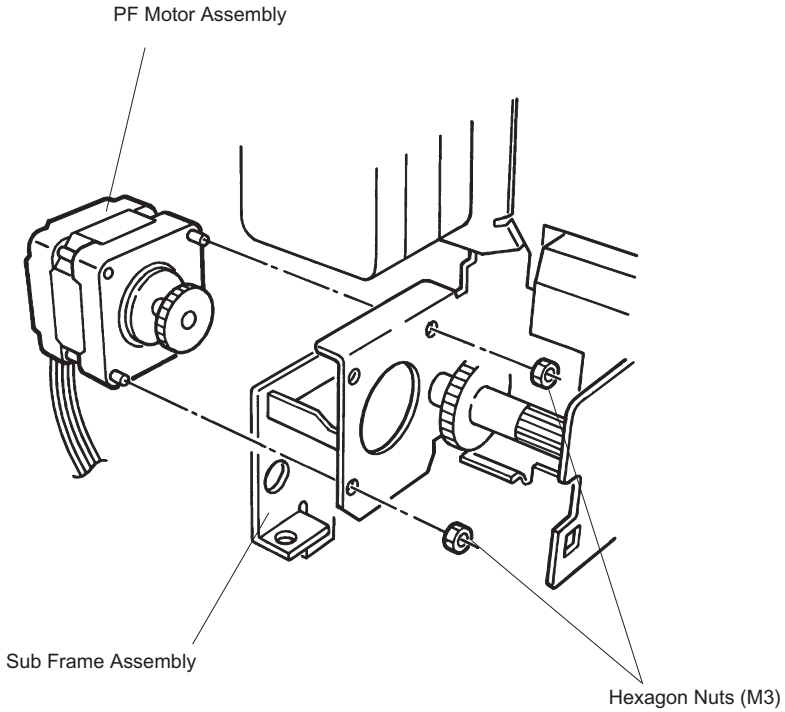


Figure 3-14. PF Motor Assembly Removal

3.2.10.3 DE (Disengage) Sensor Removal

1. Remove the printer mechanism unit. (Refer to 3.2.6.)
2. Using the tweezers, release the hooks fixing the DE sensor to the cam select assembly, then remove the DE sensor.
3. Remove the connector cable from the connector for the DE sensor.

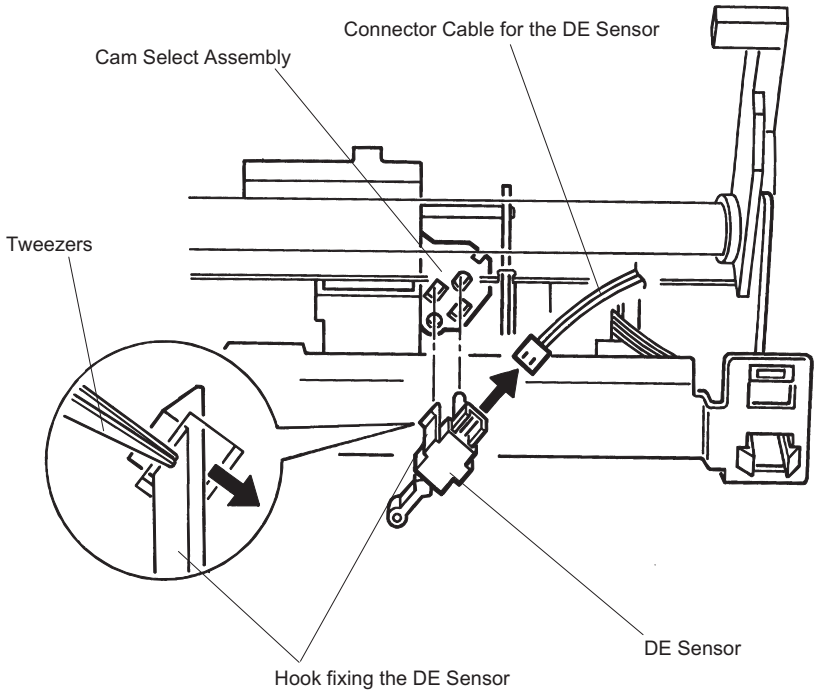


Figure 3-15. DE Sensor Removal

3.2.10.4 Front/Rear PE (Paper End) Sensor Removal

1. Remove the printer mechanism unit. (Refer to 3.2.6.)
2. Using the tweezers, release the tubs fixing the Front/Rear PE sensors to the rear paper guide at the bottom of the printer mechanism unit.
3. Disconnect the connector cables for the PE sensor from the PE sensor connectors.

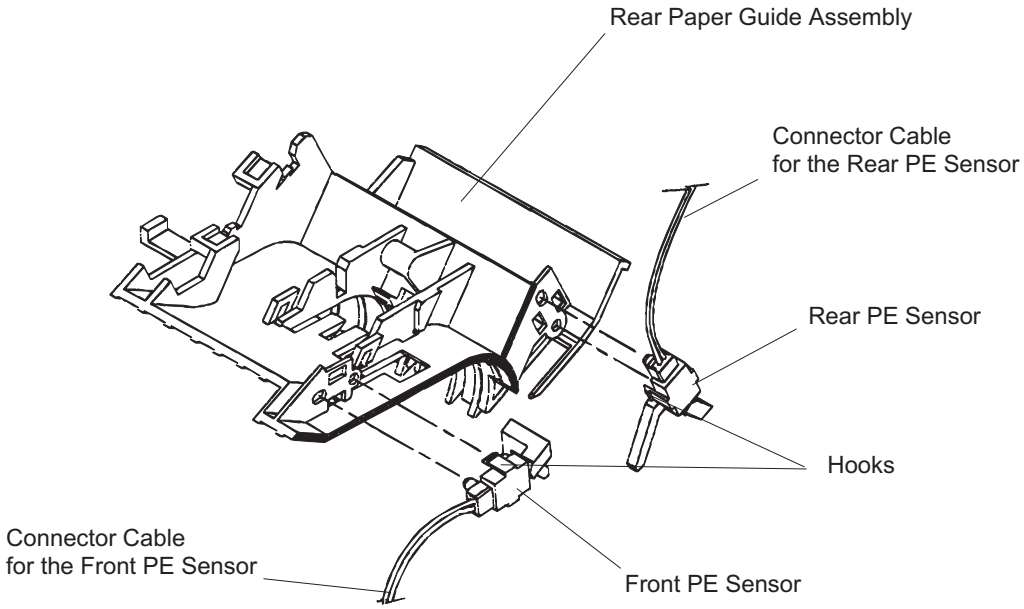


Figure 3-16. Front/Rear PE Sensor Removal

3.2.10.5 REL (Release) Sensor Removal

1. Remove the printer mechanism unit. (Refer to 3.2.6.()
2. Using the tweezers, release the tabs fxing the REL sensor to the left frame assembly. Then remove the REL sensor.

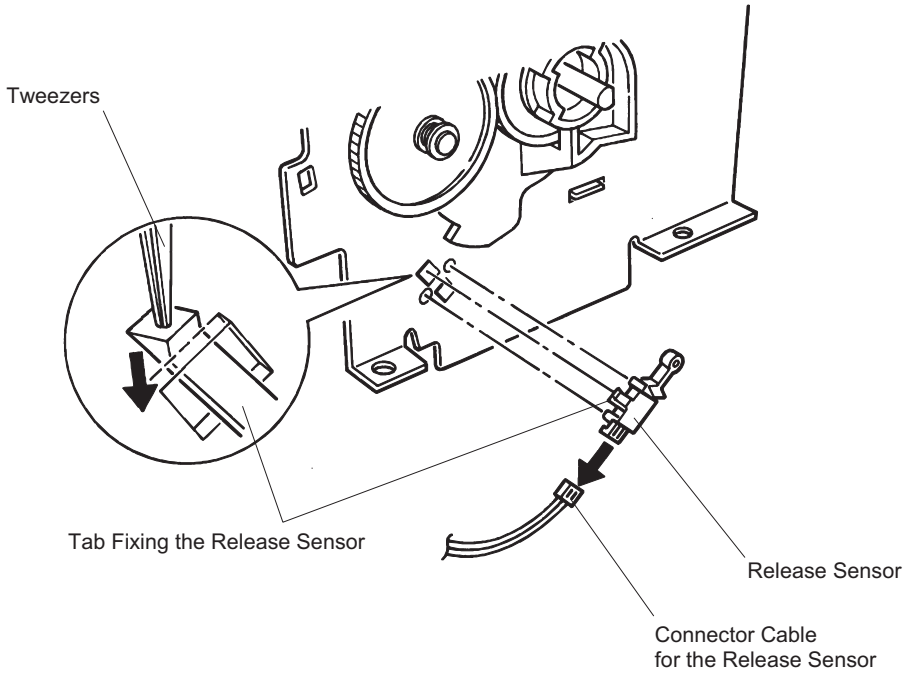


Figure 3-17. REL Sensor Removal

3.2.10.6 Edge Guide Unit Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Release the joints for the edge guide unit and the right and left paper load roller slide covers.
3. Remove 2 flange nuts (M4) securing the edge guide unit to the left and middle frame assemblies. Then remove the edge guide unit.

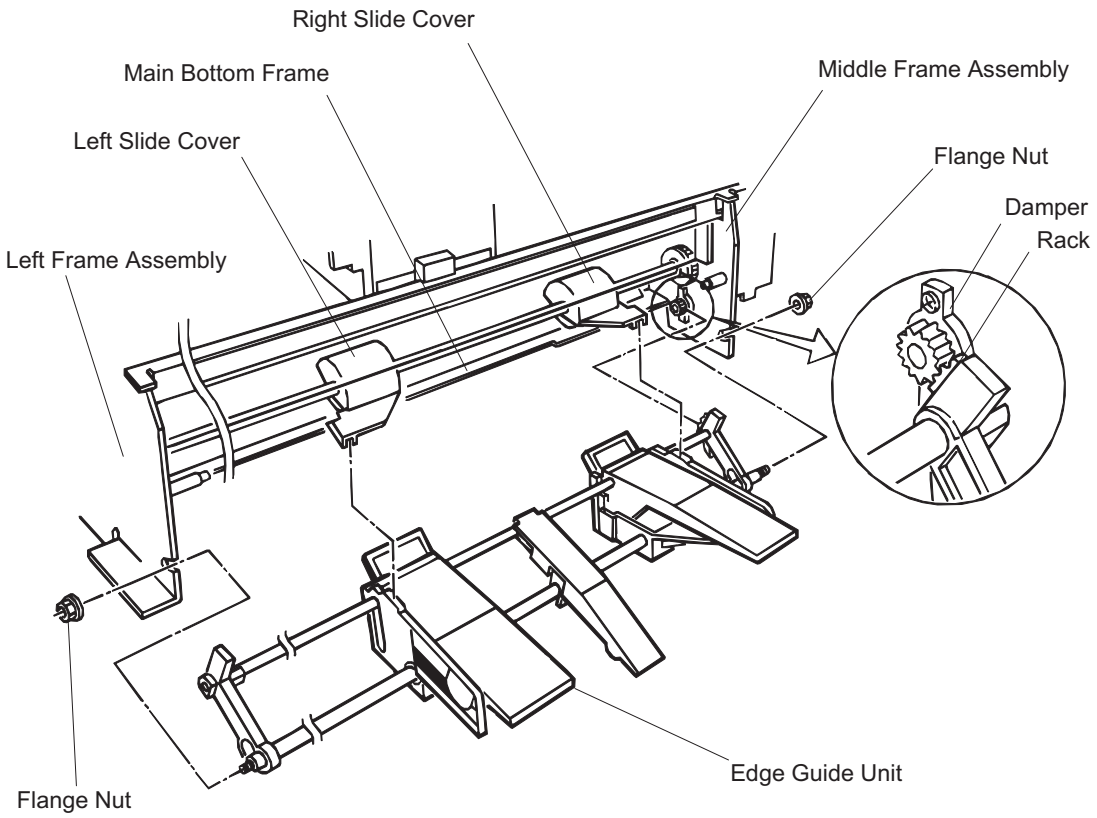


Figure 3-18. Edge Guide Unit Removal

WORK POINT

- ☑ *When installing the edge guide unit to the printer mechanism unit, be sure to engage the damper pinion with the rack on the release transmission lever.*
- ☑ *When installing the edge guide unit to the printer mechanism unit, engage the edge guide unit with the main bottom frame, as shown in the figure below.*
- ☑ *Fix the flange nuts with adhesive after fastening them. (Refer to Chapter 6.)*

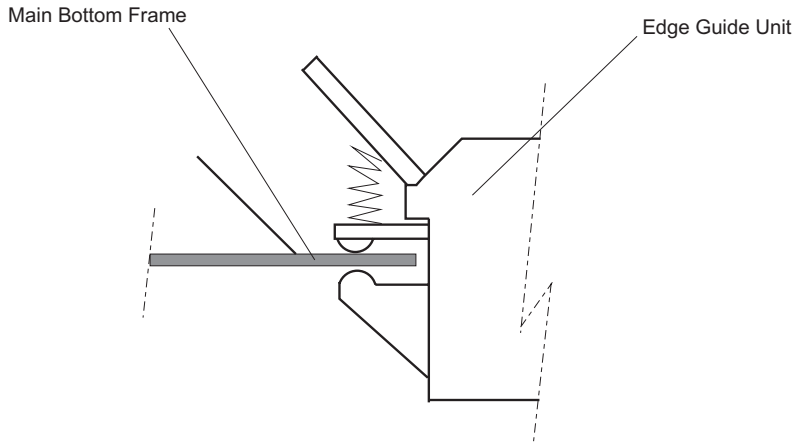


Figure 3-19.
Engagement of the Edge Guide with the Main Bottom Frame

3.2.10.7 Paper Eject Frame Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Disconnect the connector cables for HP sensor and cover open sensor from the connectors.
3. Remove 3 screws (CBS, M3X6) securing the paper eject frame to the printer mechanism unit.
4. Remove the paper eject frame by releasing the joints.

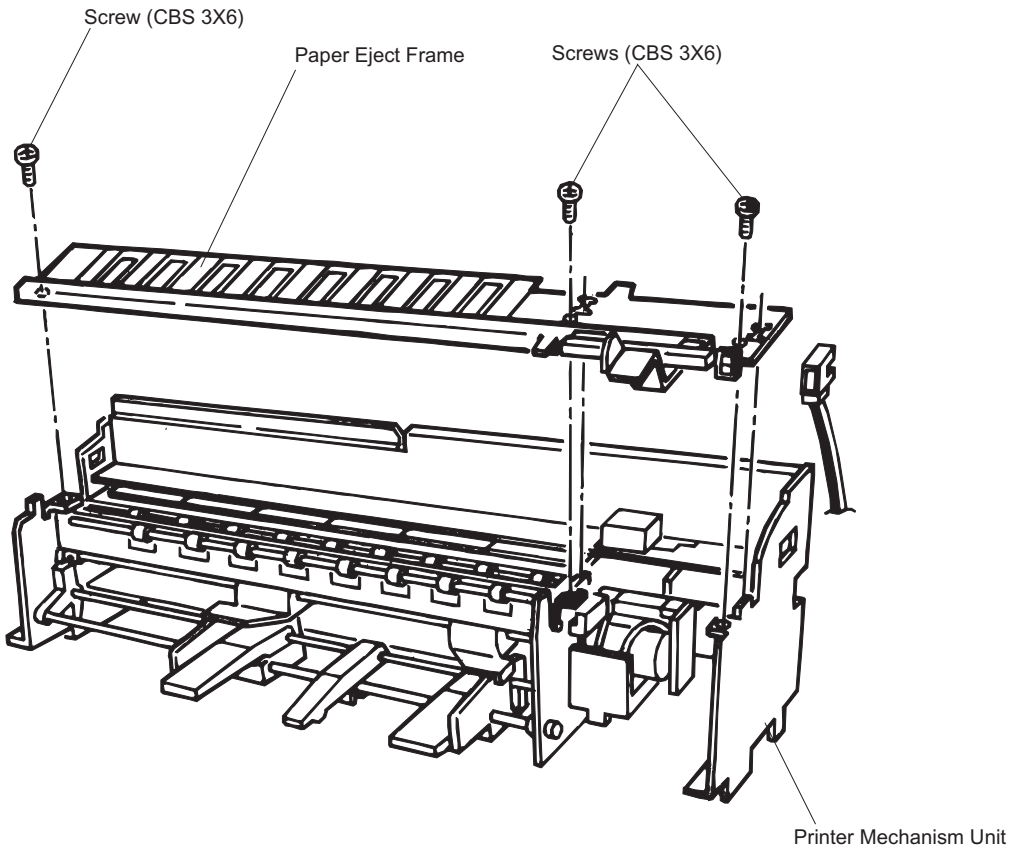


Figure 3-20. Paper Eject Frame Removal

WORK POINT

☑ *When removing the paper eject frame, place a clean piece of paper between the platen surface in the front paper guide assembly and printheads in the CR unit to protect the printheads.*

3.2.10.8 Pump Unit Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Remove the paper eject frame. (Refer to Section 3.2.10.7.)
3. Remove 2 screws (CBS, 3X6 and CBP, 3X8) securing the pump unit to the printer mechanism unit. Then remove the pump unit.

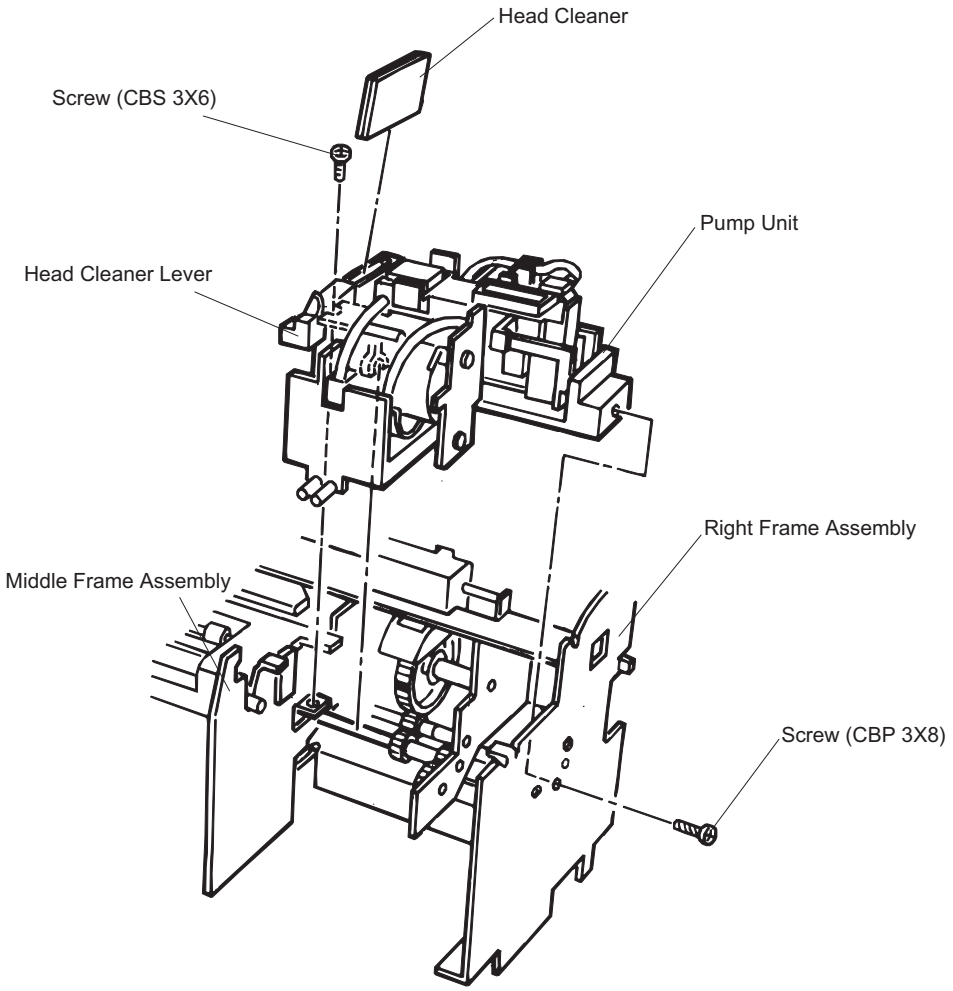


Figure 3-21. Pump Unit Removal

WORK POINT

☑ *When mounting the head cleaner onto the pump unit, set the rubber part of the cleaner facing to the pump side.*

3.2.10.9 Carriage (CR) Unit Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Remove the extension spring to release the timing belt. (Refer to the step 2 in Section 3.2.10.1.)
3. Disengage the timing belt from the pulley and sub pulley in the CR motor assembly.
4. Remove 2 E-rings and 2 plain washer from the both edges of the CR guide shaft.
5. If the head cleaner lever in the pump unit is locking the CR unit, push the lever down manually to release the CR unit.
6. Remove 1 securing the head FFCs and FFC holders to the base frame assembly. Then remove the head FFC and FFC holder from the printer mechanism unit.
7. Turn the parallelism adjust bushings joining the CR guide shaft to the right and left frame assemblies until they fit into the cutouts on the frames. Then remove the CR unit along with the CR guide shaft.
8. Remove the CR guide shaft from the CR unit.

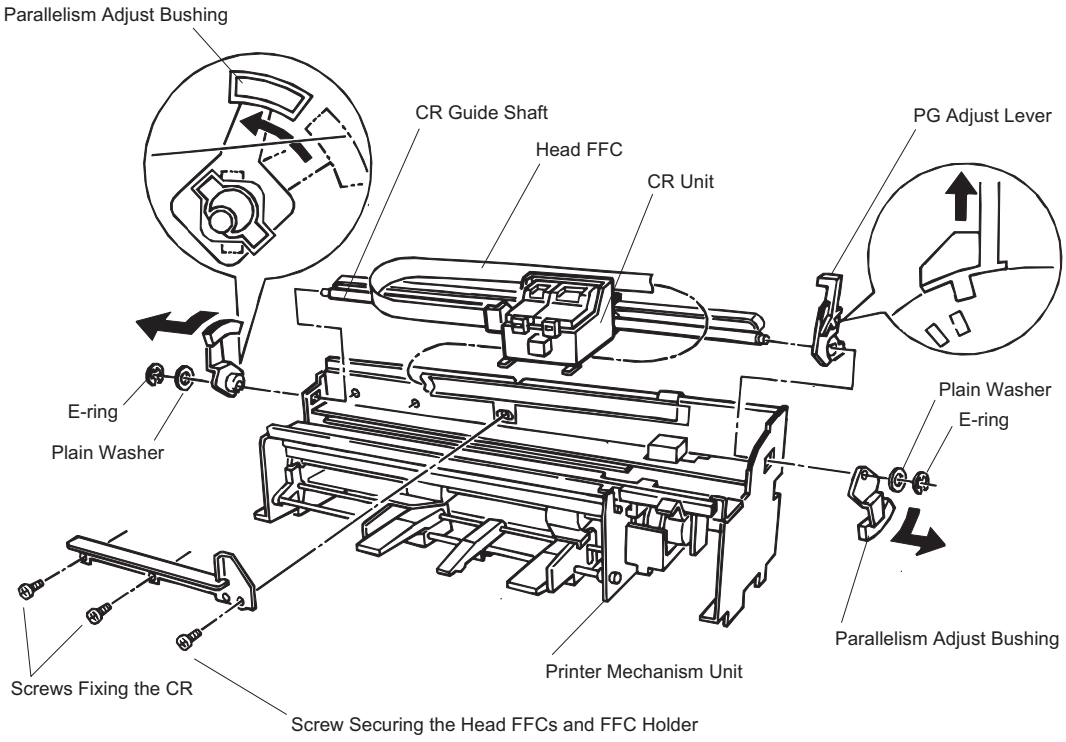


Figure 3-22. CR Unit Removal

WORK POINT

- ☑ *After removing the CR unit, do not touch and damage the heads. Protect the heads from static electricity, because the head drive circuit is directly attached to the head board.*
- ☑ *Pay attention to the oil pad when removing the CR guide shaft from the CR unit. It tends to dislocate.*
- ☑ *When installing the CR guide shaft to the printer mechanism unit, be sure to fit the platen gap adjust lever to the right frame assembly. (Refer to the figure below.)*

REQUIRED ADJUSTMENT

- ☑ *Perform platen gap adjustment, Bi-directional adjustment, and Uni-directional adjustment after installing the CR unit and parallelism adjust bushings. (Refer to Chapter 4.)*
- ☑ *If the printheads are replaced along with the CR unit, be sure to write head data to the EEPROM. (Refer to Chapter 4.)*

WORK POINT

- ☑ *When engaging the timing belt to the CR unit, note 2 parts of the belt: flat part and tooth part. Be sure to position the 2 parts of the timing belt as shown in the figure below.*

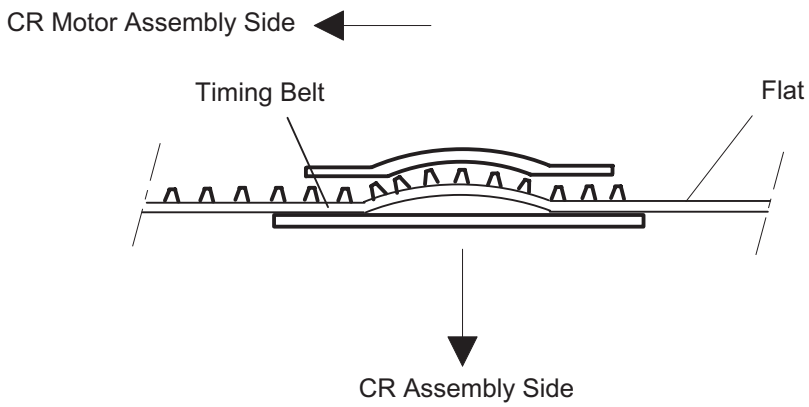


Figure 3-23. Timing Belt Installation

3.2.10.10 Base Frame Assembly Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Remove the paper eject frame. (Refer to Section 3.2.10.7.)
3. Remove the CR unit. (Refer to Section 3.2.10.9.)
4. Remove 1 E-ring fixing the gear (46) and compression spring (1.96) to the left frame assembly. Then remove the gear along with 2 plain washers and the compression spring.

WORK POINT

☑ *Be careful not to lose the compression spring. It might spring out when you remove the E-ring.*

5. Remove the tractor release cam.
6. Adjusting the sub tractor release cam with the cutout in the left frame assembly, and remove it from the tractor release shaft. (Refer to the figure below.)
7. Remove 5 screws (CBS, 3X6) securing the base frame assembly to the printer mechanism unit, then lift up the base frame assembly and remove it.

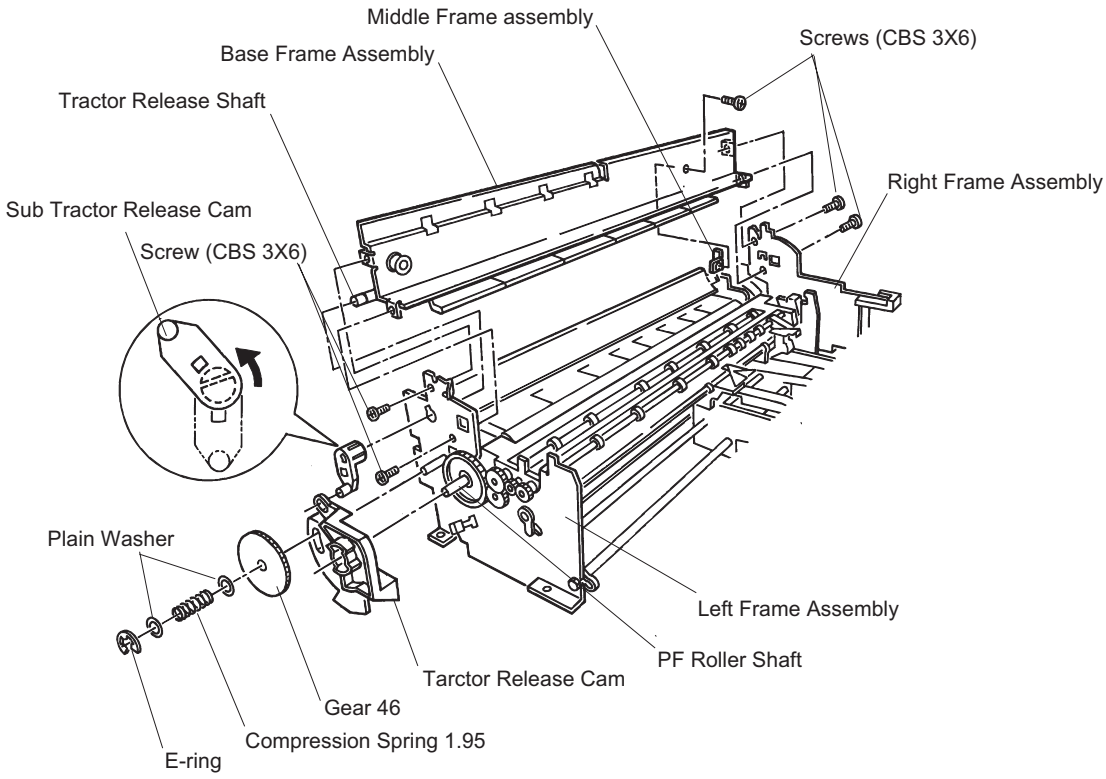


Figure 3-24. Base Frame Assembly Removal

3.2.10.11 Paper Load Roller Unit Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Remove the paper eject frame. (Refer to Section 3.2.10.7.)
3. Remove the CR unit. (Refer to Section 3.2.10.9.)
4. Remove the base frame assembly. (Refer to Section 3.2.10.10.)
5. Attach the knob to the PF roller shaft, and press the trigger lever down. Then rotate the paper load roller unit by turning the knob clock wise to hold the edge guide unit down.
6. Remove 1 screw (CBP, 3X8) securing the paper eject drive unit to the left frame assembly, and remove the paper eject drive unit by lifting up the front edge.

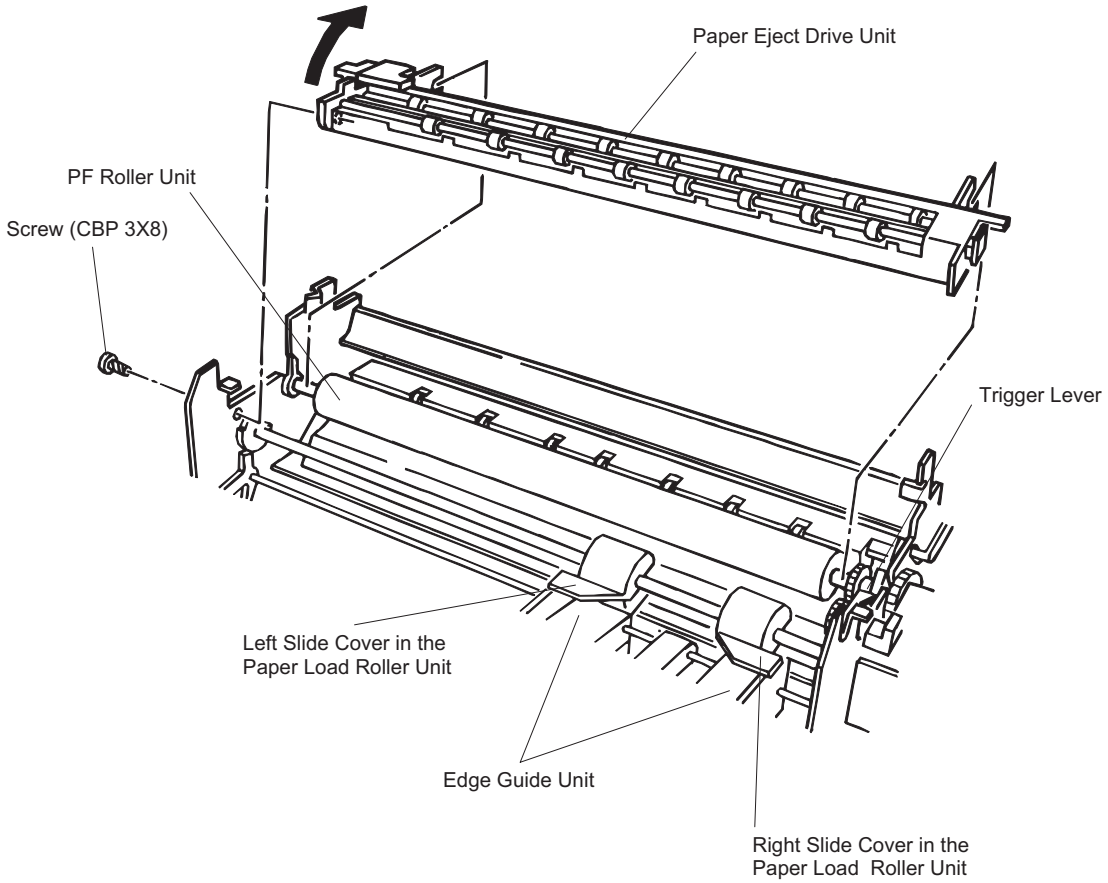


Figure 3-25. Paper Eject Drive Unit Removal

7. Release the joints for the right and left slide covers and the edge guide.
8. Remove the E-ring located at left end of the paper load roller .
9. Adjust the paper load roller bushing with the cutout on the right frame.
10. Disengage the paper load gear at the right end of the paper load roller unit from the ASF transmission gears in the middle frame. Then remove the paper load roller unit by sliding it toward the left frame assembly.

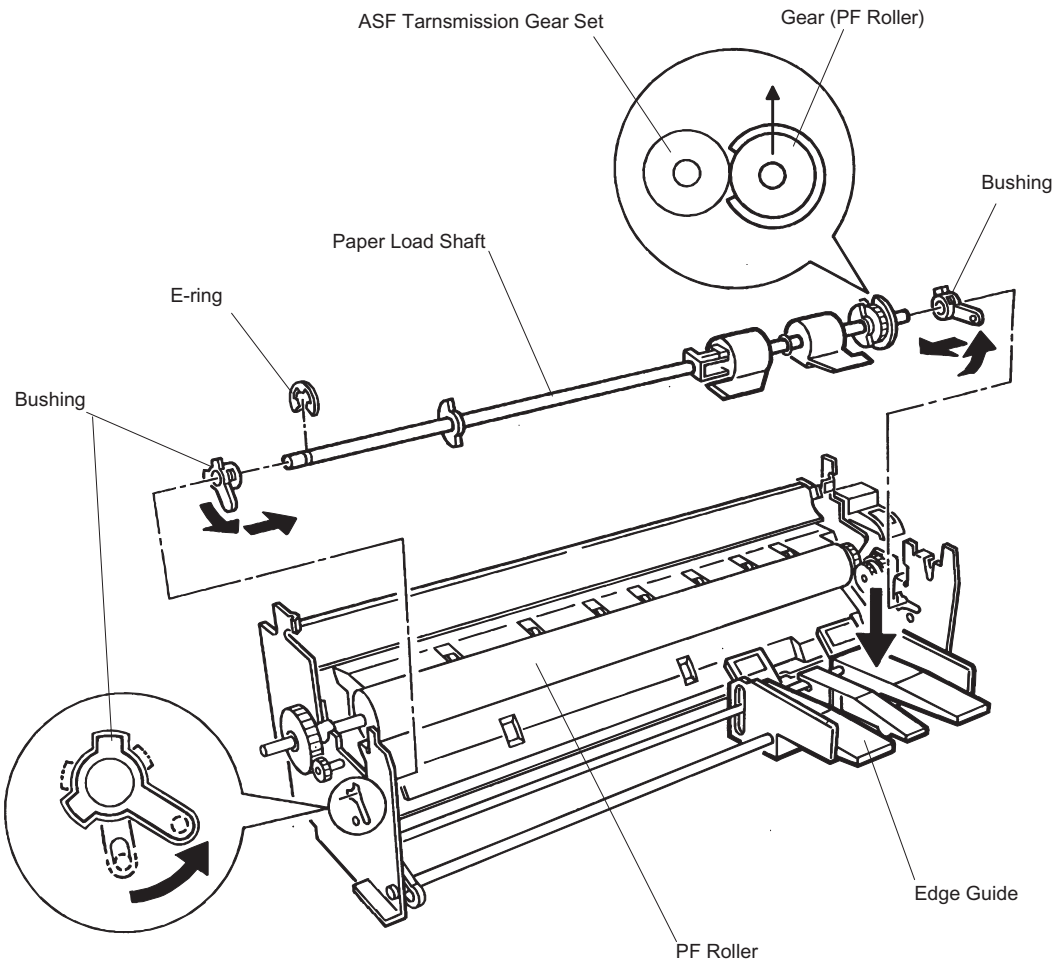


Figure 3-26. Paper Load Roller Removal

WORK POINT

- ☑ *Note the direction in which the paper load gear and the gear (29) are engaged. (Refer to the figure below.)*
- ☑ *Do not touch the gear teeth with your bare hands. Damaged gear may lose accuracy in paper feeding.*

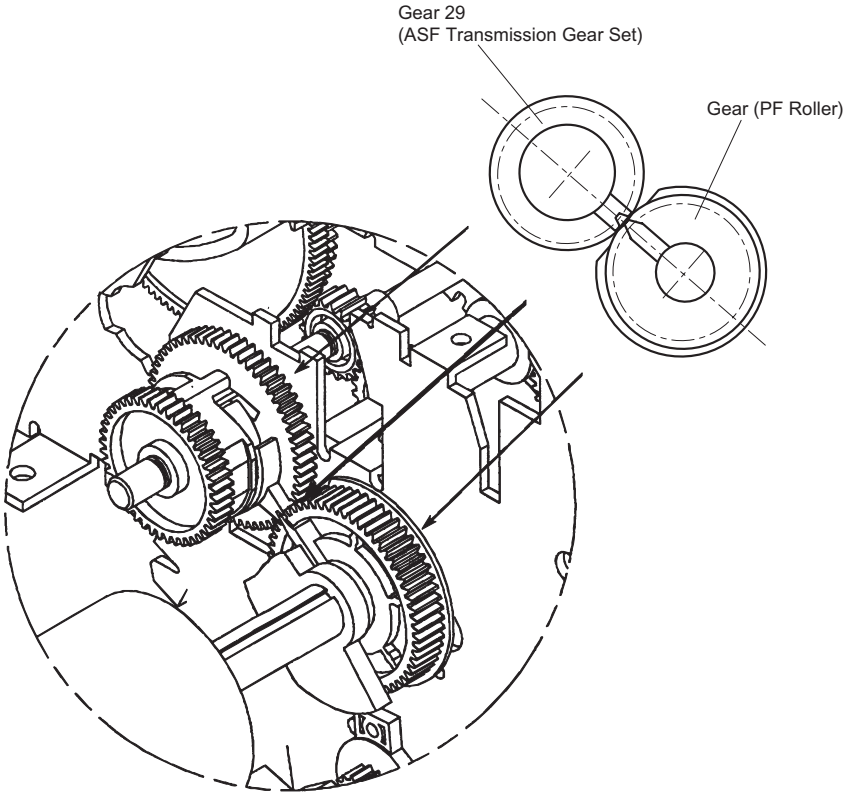


Figure 3-27. Gear Engagement

3.2.10.12 Paper Feed (PF) Roller Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Remove the paper eject frame. (Refer to Section 3.2.10.7.)
3. Remove the CR unit. (Refer to Section 3.2.10.9.)
4. Remove the base frame assembly. (Refer to Section 3.2.10.10.)
5. Remove 1 screw (CBP, 3X8) securing the paper eject drive unit to the left frame assembly. Then remove the paper eject drive unit by lifting up the front edge.
6. Remove the trigger lever from the PF roller.
7. Remove the roller grounding spring in contact with the left frame assembly at the left end of the PF roller.
8. Turn the right and left bushings to adjust them with the cutouts on the right and left frames.
9. Remove 1 E-ring from the left end of the PF roller.
10. Slide the PF roller shaft left, and disengage the PF roller gear (24) from the ASF transmission ratchet. Then remove the PF roller.

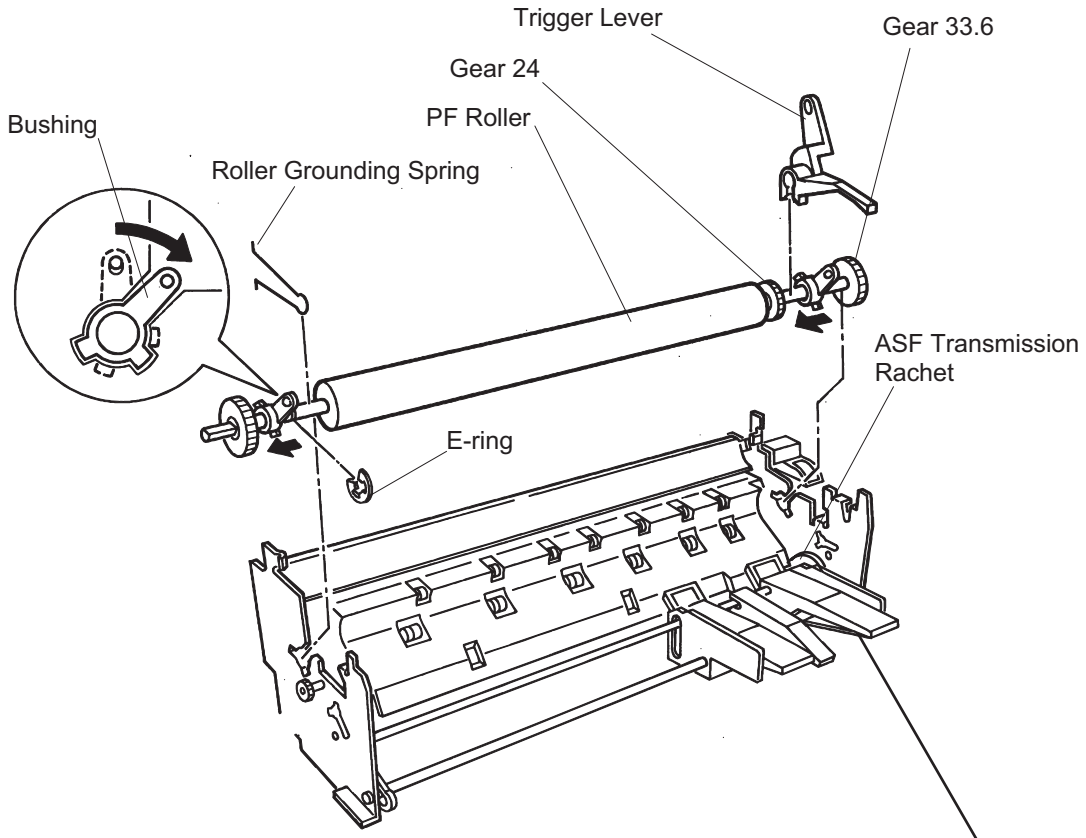


Figure 3-28. PF Roller Removal

⚠CAUTION

☑ *The gear 33.6 is highly precise. Therefore do not touch the tooth with your bare hand and be careful not to damage it.*

3.2.10.13 Rear Paper Guide Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Remove the paper eject frame. (Refer to Section 3.2.10.7.)
3. Remove the CR unit. (Refer to Section 3.2.10.9.)
4. Remove the base frame assembly. (Refer to Section 3.2.10.10.)
5. Remove the PF roller. (Refer to Section 3.2.10.12.)
6. Remove the edge guide. (Refer to Section 3.2.10.6.)
7. Remove 2 screws (CBS, 3X6) securing the paper load guide frame to the left and middle frame assemblies.
8. Release the hook fixing the rear paper guide at the right side of the main bottom frame assembly. Then slide the rear paper guide left slightly and remove it.

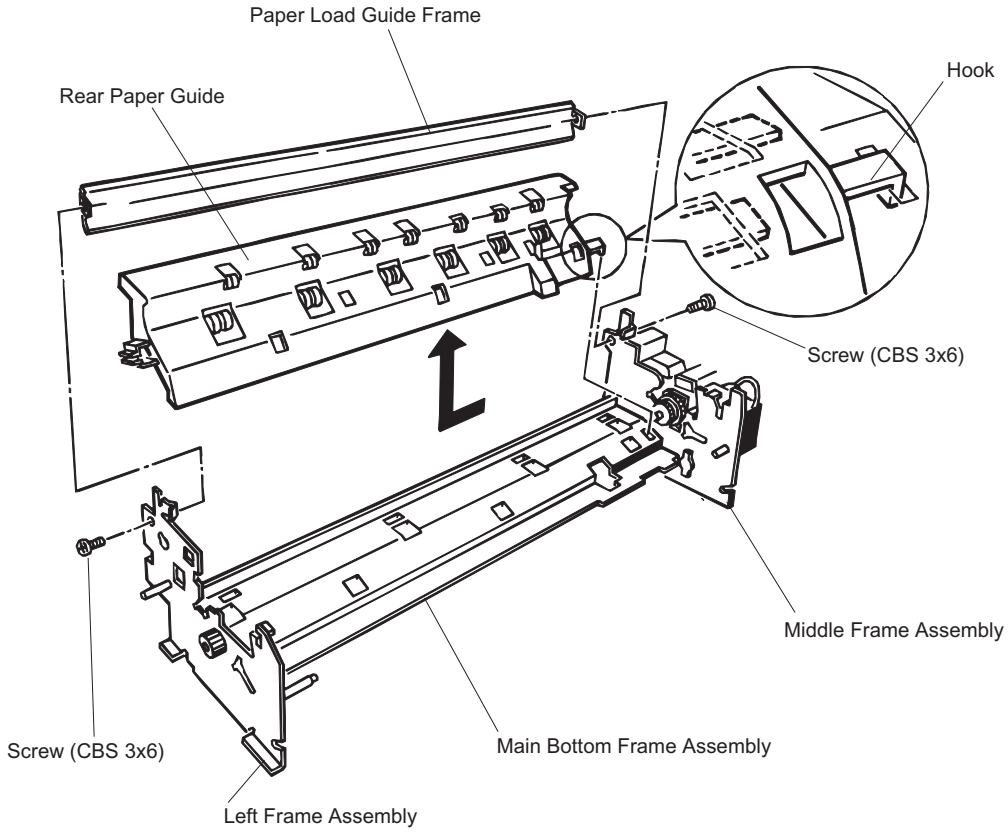


Figure 3-29. Rear Paper Guide Removal

3.2.10.14 Middle Frame Assembly Removal

1. Remove the printer mechanism unit. (Refer to Section 3.2.6.)
2. Remove the paper eject frame. (Refer to Section 3.2.10.7.)
3. Remove the pump unit. (Refer to Section 3.2.10.8.)
4. Remove the CR unit. (Refer to Section 3.2.10.9.)
5. Remove the base frame assembly. (Refer to Section 3.2.10.10.)
6. Remove the PF roller assembly. (Refer to Section 3.2.10.12.)
7. Remove the edge guide unit. (Refer to Section 3.2.10.6.)
8. Remove 1 screw (CBS, 3X6) securing the paper load guide frame to the middle frame assembly.
9. Remove the connector cable for the middle frame assembly from the clump.
10. Remove 2 screws (CBS, 3X6) securing the middle frame assembly to the bottom main frame assembly. Then remove the middle frame assembly.

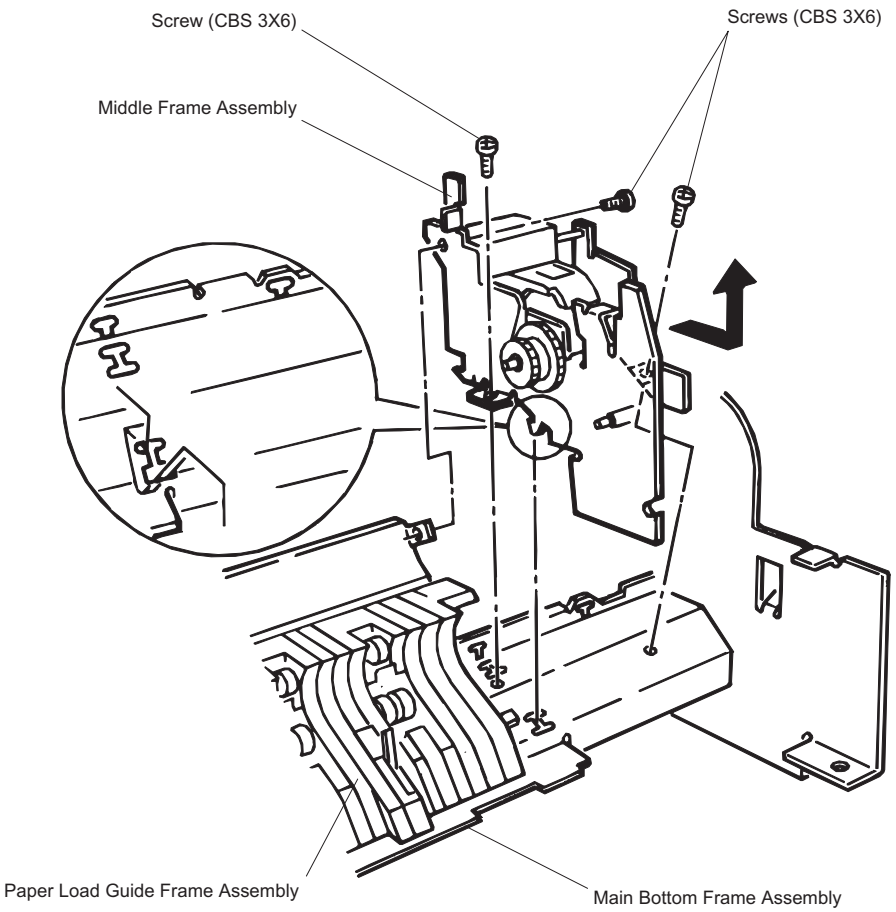


Figure 3-30. Middle Frame Assembly Removal

Chapter 4
Adjustment

4.1 Over View 1
4.1 .I Platen Gap Adjustment.. 2
4.1.2 Initialize Operation 4
4.1.3 Head Voltage Write Operation 5
4.1.3.1 Finding out the Head Voltage 6
4.1.4 Black Head Angular Adjustment 7
4.1.5 Color Head Angular Adjustment 8
4.1.6 BK-M Height Adjustment.. 9
4.1.7 Bi-d Adjustment.. ..... .10
4.1.8 Head GAP Adjustment ..... .11
4.1.9 Uni-d Adjustment.. ..... .12

4.1 Over View

This section describes adjustmenta required after disassembling and assembling the printer.

⚠CAUTION

- ☑ *Adjustment must be performed in the order numbered in Table 4-1.*
- ☑ *Be sure to leave the ink cartridges installed in the CR unit when returning the printer to the customer.*
- ☑ *Use 720 dpi exclusive paper when printing the adjustment pattern.*

Table 4-1 Required Adjustment

Replaced Unit/Part	Adjustment Menu
Replacement of the printer mechanism or MAIN board	1. EEPROM Clear (Refer to Section 1.4.3.) 2. Head Voltage Write 3. BK-M Hight Adjustment 4. Head Gap Adjustment 5. Uni-D Adjustment 6. Bi-d Adjustment
Black head replacement	1. Head VH voltage input *2.* Black Head Angular Adjustment 3. BK-M Hight Adjustment 4. Head Gap Adjustment
Black head removal	1. Black Head Angular Adjustment 2. BK-M Hight Adjustment 3. Head Gap Adjustment
Color head replacement	1. Head VH voltage input *2.* Color Head Angular Adjustment 3. BK-M Hight Adjustment *4.* Head Gap Adjustment
Color head removal	1. Color Head Angular Adjustment 2. BK-M Hight Adjustment 3. Head Gap Adjustment
CR unit Replacement	1. Platen Gap adjustment 2. Head Voltage Write 3. Uni-D Adjustment 4. Bi-d Adjustment
CR unit removal *or* CR unit disassemblina	1. Platen Gap adjustment 2. Uni-D Adiustment 3. Bi-d Adjustment
CR motor removal or CR motor disassembling	1. Uni-D Adjustment 2. Bi-d Adjustment

Note) The adjusting program doesn't run without inputting the customer data first.

4.1.1 Platen Gap Adjustment

This adjustment is performed to obtain the appropriate gap between the head nozzle surface and the platen. It must be adjusted after removing or replacing the CR guide shaft, CR unit or parallelism adjust bushing. **The specified value for the platen gap is 1.16 ± 0.02 mm.**

1. Set the right and left parallelism adjust bushings to the middle of the adjusting range.
2. Place the thickness gauge as illustrated below.

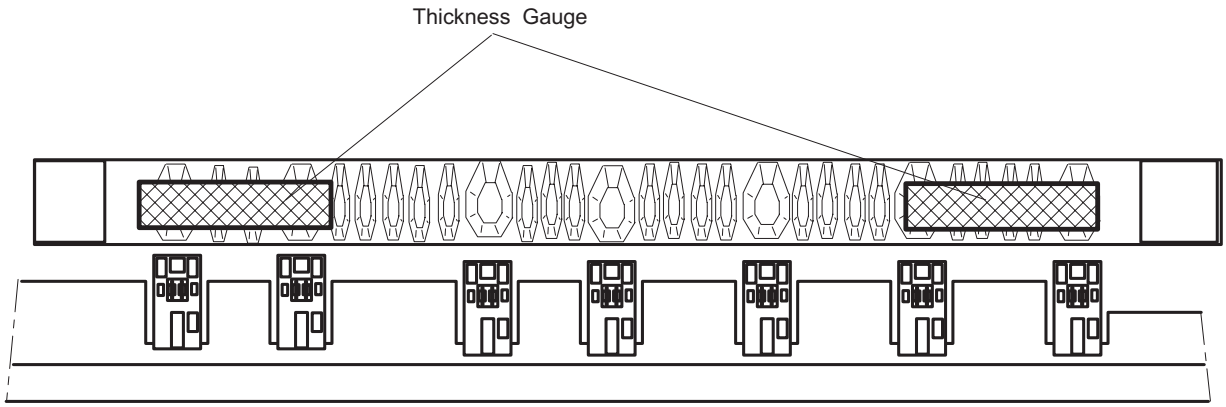


Figure 4-1. Thickness Gauge Placement

3. (See the flowchart in Page 4-3.)
   Turn the left parallelism adjust bushing to make the gap enough to insert a 1.14 mm-thick gauge. Make sure that a 1.18 mm-thick gauge does not pass through. (Table 4-2 shows the directions for turning the bushings to change the platen gap.)

Table 4-1 Platen Gap and Parallelism Adjust Bushing

Platen gap	Left parallelism adjust bushing	Right parallelism adjust bushing
Narrower	CW	CCW
Wider	CCW	CW

4. Apply the same procedure for the right parallelism adjust bushing.

⚠ CAUTION

- ☑ *Platen gap is adjusted using the black head as a basis. Therefore do not inset the thickness gauge under the color head.*
- ☑ *Open the platen gap by setting the platen gap to "+" side before shifting the CR unit.*

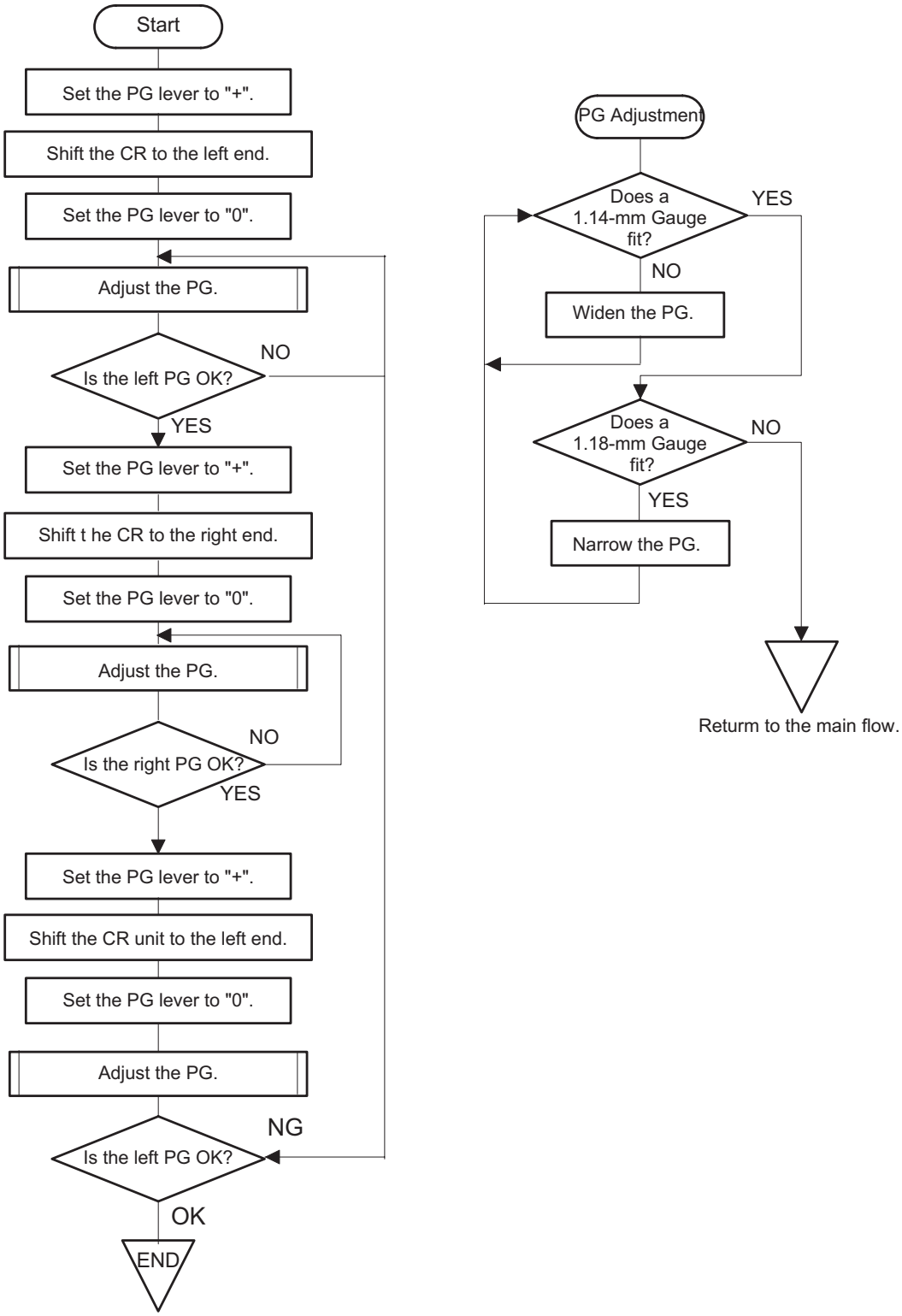


Figure 4-2. Platen Gap Adjustment Flow Chart

4.1.2 Initialize Operation

This operation is performed to write the factory values in the EEPROM on the MAIN board. With this operation, the factory values are written in at a time.

1. Connect the printer and the host computer with a parallel interface cable.
2. Start the adjustment program in the host computer.
3. Select "CUSTOMER SET" in the 1 st menu and press the Enter key.
4. Move the cursor using ↑ or ↓ key to select an appropriate customer code and area. Then press the Enter key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select "ADJUST" in the 1st menu. Then press the Enter key, and the main menu appears on the monitor.
6. Move the cursor using ↑ or ↓ key to select "INITIALIZE". Then press the Enter key to execute the initialization. Then press the Enter key to return to the main menu.
7. Select other adjustment using ↑ or ↓ key, or select RETURN TO 1st MENU to exit the main menu.
8. Move the cursor using ↑ or ↓ key to select "END" and press the Enter key to exit the program.

Note

1. Unless "CUSTOMER SET" is executed, the program does not proceed to the main menu.
2. Input of an incorrect customer code does not assure the proper operation of the program.

WORK POINT

- ☑ *Adjusted values are not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*
- ☑ *The set value is transferred to the printer when this operation is executed. Therefore do not turn off the printer before executing "INITIALIZE".*

4.1.3 Head Voltage Write Operation

This operation is performed to write the print head drive voltages in the EEPROM. You need to perform this operation whenever you replace the prihthead.

1. Connect the printer and the host computer with a parallel interface cable.
2. Run the adjustment program in the host computer.
3. Input the customer data. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select "ADJUST" in the 1st menu. Then press the Enter Key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select "HEAD VOLTAGE WRITE". Then press the Enter key, and the "HEAD VOLTAGE WRITE" program starts. You are to input the data for the black head. The head ID (head voltage) is marked on the left side of the head, as shown below.

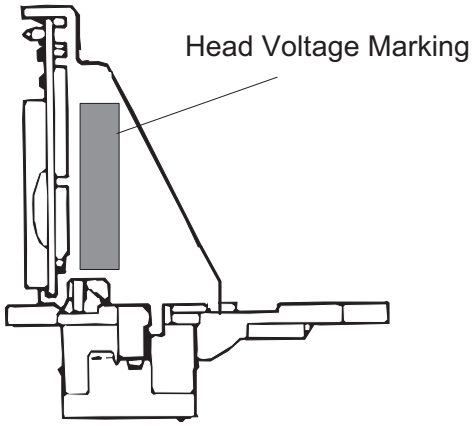


Figure 4-3. Head ID Marking

6. Write the black head ID (head voltage), which is composed of 5 digits, as shown below,. The first 2 digits and the following 2 digits indicate the head ID for the normal dot and head ID for microweave dot respectively. The last digit indicates the rank value.

   Black Voltage (5- digit-ID) : * * * * *
   Color Voltage (5 digit-ID) : * * * * *

7. Press the Space key if you correct a wrong ID. Enter "0" to exit "HEAD VOLTAGE WRITE", and the main menu appears on the monitor.
   Note If the Enter key is pressed, the initial ink charge is performed and the program returns to the main menu.
8. Select other adjustment menu using ↑ or ↓ key, or select "RETURN TO 1st MENU" to exit the main menu.
9. Move the cursor using ↑ or ↓ key to select "END" and press the Enter key to exit the adjustment program.

WORK POINT

- ☑ *Adjusted values are not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*
- ☑ *The set value is transferred to the printer when this operation is executed. Therefore do not turn off the printer before exiting "HEAD VOLTAGE WRITE".*

4.1.3.1 Finding out the Head Voltage

Normally, the head voltage is not acknowledged without checking the head ID by removing the head. This program is, however, designed to read the head voltage data stored in the EEPPROM on the MAIN Board. This section described how to find out the head voltages.

1. Connect the printer and the host computer with a parallel interface cable.
2. Run the adjustment program in the host computer.
3. Input the customer data. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select "ADJUST" in the 1st menu. Then press the Enter key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select "A4 CHECK PATTERN". Then press the Enter key, and the printer prints out the check patterns and the item shown below;

   6. TITLE
   [C211***] Stylus COLOR 1520 BK:<B1, B2, B3, B4, B5, B6, B7, B8> YMC:<C1, C2, C3, C4, C5, C6, C7, C8>

6. Head ID (head voltage) is identified as described below;

   B2 and B3 : Represent the black head drive voltage for the normal dot
   B5 : Represents the black head rank value
   B7 and B8 : Represent the black head drive voltage for the microweave dot

   B1, B4 and B6 are usually "0" and you can ignore them when inputting the head voltage. Apply the same procedure for the color head.

4.1.4 Black Head Angular Adjustment

This adjustment must be made when replacing or disassembling the black head. The black head is held by the compression spring to the supporting point of the CR unit and the angle adjust lever located under the black head. The adjust lever is used to swing the black head in parallel to the printing surface. With this operation, the nozzles on the head are aligned parallel to the paper feed direction.

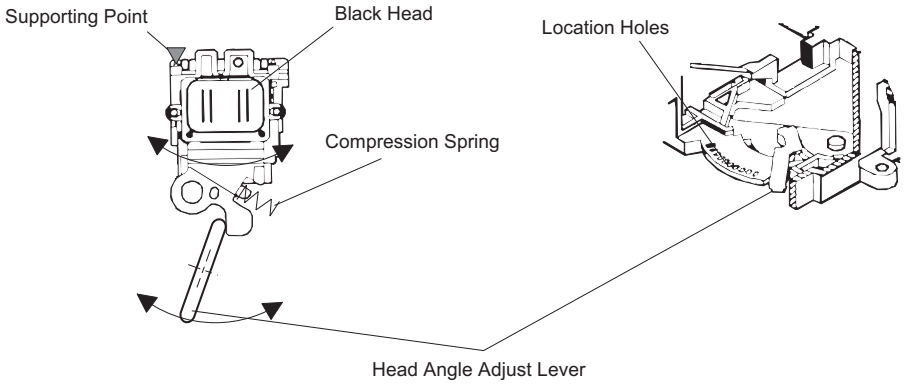


Figure 4-4. Head Angular Adjustment

1. Connect the printer and the host computer with a parallel interface cable.
2. Run the adjustment program in the host computer.
3. Input the customer data. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select "ADJUST" in the 1st menu. Then press the Enter key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select "HEAD ANGULAR ADJUSTMENT". Then press the Enter key, and the printer prints out the head angular adjustment patterns.
6. Move the angle adjust lever to align the vertical lines continuously by making the width (A) less than 4/1 of the line width, as shown in Figure 4-5.

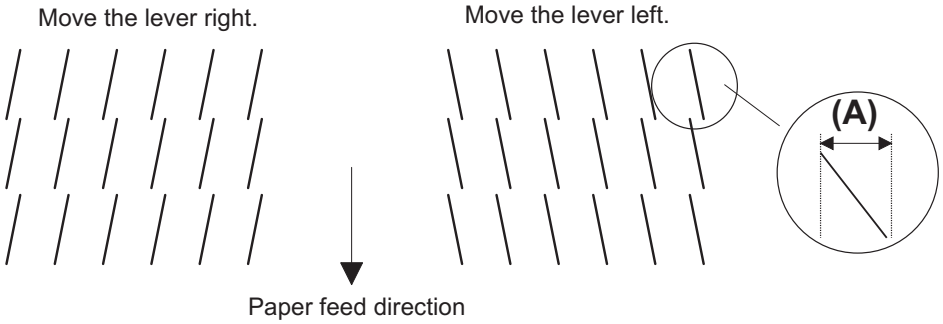


Figure 4-5. Black Head Angular Adjustment

7. Press the Space key to repeat the operation. Press the Enter key to exit "Black Head Angular Adjustment", and the main menu appears.
8. Select other adjustment using ↑ or ↓ key, or select "RETURN TO 1st MENU" to exit the main menu.
9. Move the cursor using ↑ or ↓ key to select "END" and press the Enter key to exit the adjustment program.

⚠CAUTION

- ☑ *While moving the angle adjust lever, lift it up a little.*
- ☑ *Ensure that the lever does not move by fitting the notches in the lever to the location holes on the CR unit securely.*
- ☑ *Do not move the lever with much force, since it is breakable.*

4.1.5 Color Head Angular Adjustment

You must make this adjustment when replacing or disassembling the color head. The color head is, same as black head, held by the compression spring to the supporting point of the CR unit and the angle adjust lever located under the color head. The adjust lever is used to swing the color head in parallel to the printing surface. With this operation, the YMC heads are set at a proper angle.

1. Connect the printer and the host computer with a parallel interface cable.
2. Start the adjustment program in the host computer.
3. Input the customer data. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select "ADJUST" in the 1st menu. Then press the Enter key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select "HEAD ANGULAR ADJUSTMENT". Then press the Enter key, and the printer prints out the head angular adjustment patterns.
6. Move the angle adjust lever to make the deviation (B) between 2 colors less than 4/1 of the line width.
   (Refer to Figure 4-6.)

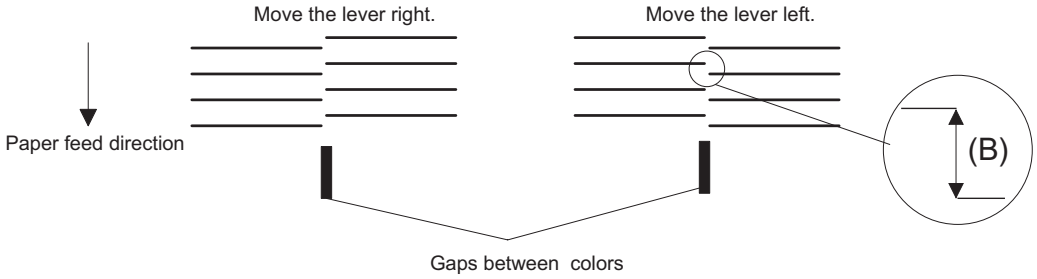


Figure 4-6. Color Head Angular Adjustment

7. Press the Space key to repeat the operation. Press the Enter key to exit "Color Head Angular Adjustment", and the main menu appears.
8. Select other adjustment using ↑ or ↓ key, or select "RETURN TO 1st MENU" to exit the main menu.
9. Move the cursor using ↑ or ↓ key to select "END" and press the Enter key to exit the adjustment program.

⚠ CAUTION

- ☑ *While moving the angle adjust lever, lift it up a little.*
- ☑ *Ensure that the lever does not move by fitting the notches in the lever to the location holes on the CR unit securely.*
- ☑ *Do not move the lever with much force, since it is breakable.*

4.1.6 BK-M Height Adjustment

This adjustment is needed when the black/color head or both heads are removed or disassembled. With this operation, the vertical position for the black and color head are aligned. To make the adjustment, adjust the vertical position for the color heads based on the black head position by moving the head vertical adjust lever.

1. Connect the printer and the host computer with a parallel interface cable.
2. Run the adjustment program in the host computer.
3. Input the customer data. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select "ADJUST" in the 1st menu. Then press the Enter key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select "BK-M HIGHT ADJUSTMENT". Then press the Enter key, and the printer prints out the BK-M height adjustment patterns.
6. Make the adjustment by moving the head vertical adjust lever, as shown in Figure 4-7.

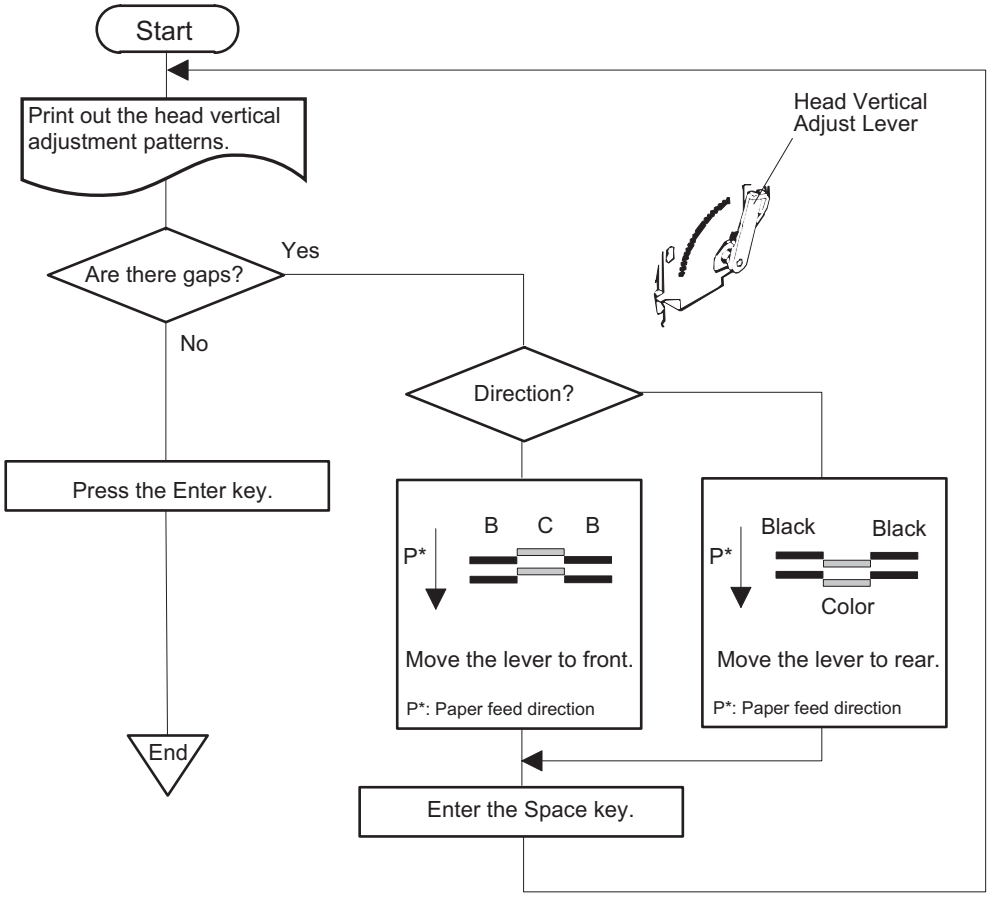


Figure 4-7. BK-M Height Adjustment Flow Chart

7. Press Space key to repeat the operation. Press the Enter key to exit "BK-M HIGHT ADJUSTMENT", and the main menu appears.
8. Select other adjustment using ↑ or ↓ key, or select "RETURN TO 1st MENU" to exit the main menu.
9. Move the cursor using ↑ or ↓ key to select "END" and press the Enter key to exit the adjustment program.

⚠ CAUTION

☑ *While moving the head vertical adjust lever, lift it up a little. When fixing it, make sure that the notches of the lever are securely engaged with the location holes on the CR unit so that the lever does not move.*

4.1.7 Bi-d Adjustment

This is required when the CR unit or CR motor is replaced or removed. You perform this operation to adjust the deviation occurs between lines printed in 2 different print directions when the printer is in the Bi-directional printing mode.

1. Connect the printer and the host computer with a parallel interface cable.
2. Start the adjustment program in the host computer.
3. Input the customer data. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select "ADJUST" in the 1st menu. Then press the Enter key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select "Bi-d ADJUSTMENT". Then press the Enter key, and the printer prints out the Bi-d adjustment patterns in the draft and LQ modes.
6. Adjust the deviation referring to the flowchart below to make the deviation (C) less than 1/2 of the line width in the draft mode and 1/3 of the line width in the LQ mode. (Refer to Figure 4-8.)

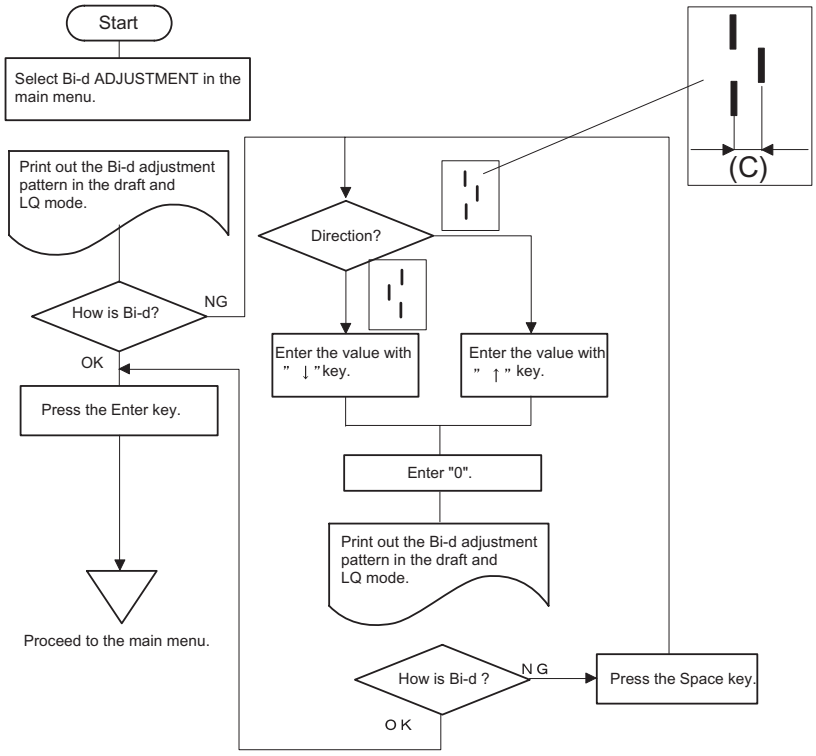

Start
Select Bi-d ADJUSTMENT in the main menu.
Print out the Bi-d adjustment pattern in the draft and LQ mode.
How is Bi-d?
NG
OK
Press the Enter key.
Proceed to the main menu.
Direction?
Enter the value with " ↓ " key.
Enter the value with " ↑ " key.
Enter "0".
Print out the Bi-d adjustment pattern in the draft and LQ mode.
How is Bi-d ?
N G
O K
Press the Space key.
(C)

Figure 4-8. Bi-d Adjustment Flow Chart

7. Press Space key to repeat the operation. Press the Enter key to exit "Bi-d Adjustment", and the main menu appears.
8. Select other adjustment using ↑ or ↓ key, or select "RETURN TO 1st MENU" to exit the main menu.
9. Move the cursor using ↑ or ↓ key to select "END" and press the Enter key to exit the adjustment program.

⚠ CAUTION

☑ *Adjusted values are not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*

☑ *The set values are transferred to the printer when exiting this operation. Therefore do not turn off the printer before executing "Bi-d Adjustment".*

4.1.8 Head GAP Adjustment

This operation is required when the black/color head or the both heads are removed or replaced. It is performed to align the vertical lines between black and color heads.

1. Connect the printer and the host computer with a parallel interface cable.
2. Run the adjustment program in the host computer.
3. Input the customer data. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select "ADJUST" in the 1st menu. Then press the Enter key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select "HEAD GAP ADJUSTMENT". Then press the Enter key, and the printer prints out the head gap adjustment patterns in the both LQ and SLQ modes.
6. Adjust the deviation referring to the flowchart below to make the deviation (D) less than 2/1 of the line width in the LQ mode and 1/4 of the line width in the SLQ mode. (Refer to Figure 4-9.)

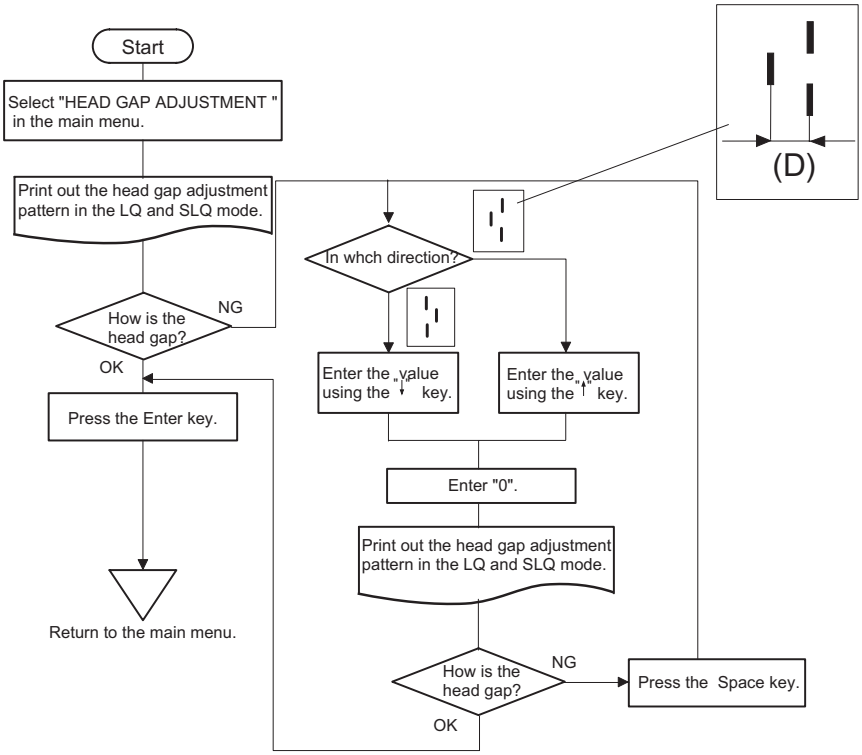

Start
Select "HEAD GAP ADJUSTMENT " in the main menu.
Print out the head gap adjustment pattern in the LQ and SLQ mode.
How is the head gap?
NG
OK
Press the Enter key.
Return to the main menu.
In whch direction?
Enter the value using the "↓" key.
Enter the value using the "↑" key.
Enter "0".
Print out the head gap adjustment pattern in the LQ and SLQ mode.
How is the head gap?
NG
OK
Press the Space key.
(D)

Figure 4-9. Head Gap Adjustment Flow

7. Press Space key to repeat the operation. Press the Enter key to exit "HEAD GAP ADJUSTMENT", and the main menu appears.
8. Select other adjustment using ↑ or ↓ key, or select "RETURN TO 1st MENU" to exit the main menu.
9. Move the cursor using ↑ or ↓ key to select "END" and press the Enter key to exit the adjustment program.

⚠ CAUTION

- ☑ *Adjusted values are not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*
- ☑ *The set values are transferred to the printer when exiting this operation. Therefore do not turn off the printer before executing "HEAD GAP ADJUSTMENT".*

4.1.9 Uni-d Adjustment

This is required when the CR unit or CR motor is replaced or removed. You perform this operation to adjust the deviation occurs between lines printed in ***2*** different print directions when the printer is in the Uni-directional printing mode.

1. Connect the printer and the host computer with a parallel interface cable.
2. Start the adjustment program in the host computer.
3. Input the customer data. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select “ADJUST” in the 1st menu. Then press the Enter key, and the main menu appears on the monitor.
5. Move the cursor using ↑ or ↓ key to select “Uni-d ADJUSTMENT”. Then press the Enter key, and the printer prints out the Uni-d adjustment patterns in the draft mode.
6. Adjust the deviation referring to the flowchart below to make the deviation less than 1/2 of the line width.

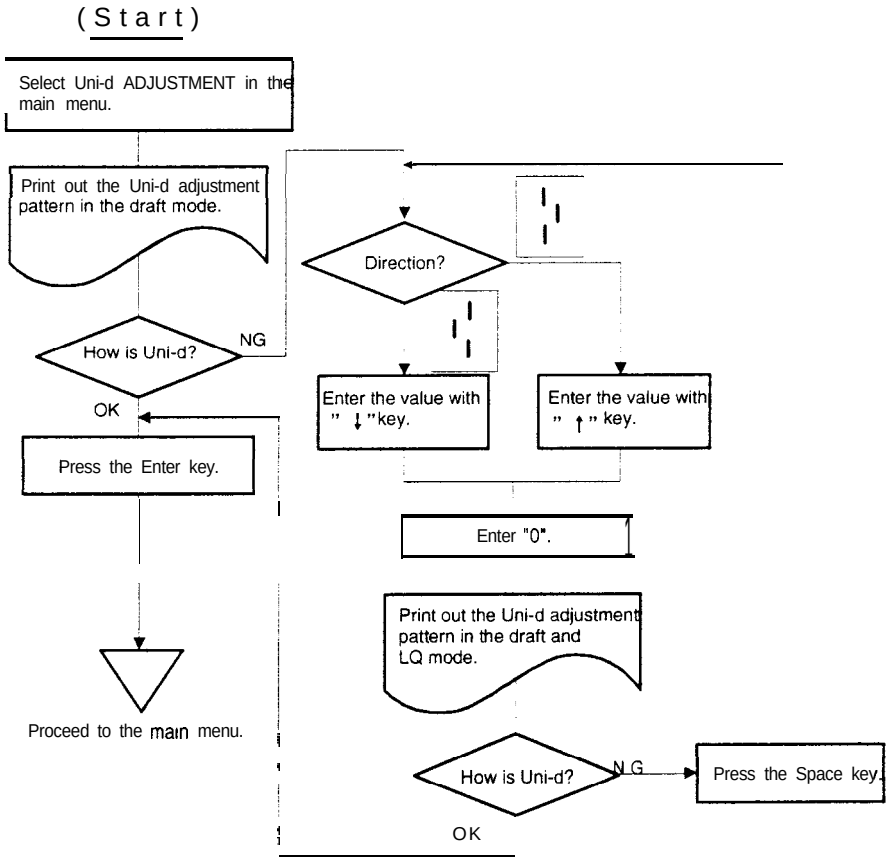

(Start)
Select Uni-d ADJUSTMENT in the main menu.
Print out the Uni-d adjustment pattern in the draft mode.
How is Uni-d?
NG
OK
Press the Enter key.
Proceed to the main menu.
Direction?
Enter the value with " ↓ "key.
Enter the value with " ↑ " key.
Enter "0".
Print out the Uni-d adjustment pattern in the draft and LQ mode.
How is Uni-d?
NG
Press the Space key.
OK

Figure 4-10. Uni-D Adjustment Flowchart

7. Press Space key to repeat the operation. Press the Enter key to exit “Uni-d Adjustment”, and the main menu appears.
8. Select other adjustment using ↑ or ↓ key, or select “RETURN TO 1st MENU” to exit the main menu.
9. Move the cursor using ↑ or ↓ key to select “END” and press the Enter key to exit the adjustment program.

⚠ CAUTION

☑ *Adjusted values are not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*

☑ *The set values are transferred to the printer when exiting this operation. Therefore do not turn off the printer before executing “Uni-d Adjustment”.*

Chapter 5
Troubleshooting

5.1 General Description 5-1
5.2 Unit Level Troubleshooting 5-3
5.3 Repair of the C172 PSB/PSE Board at Component Level 5-9
5.4 Component Repair of the C211 MAIN Board 5-10
5.5 Repair of M-4I60 Printer Mechanism 5-12

5.1 General Description

This section describes procedures for isolating the failure unit in 2 levels; unit level troubleshooting and the component level troubleshooting. You are to refer to the flowchart below to isolate the defective unit and perform repair at the component level. Table 5-1, Table 5-2 and Table 5-3 show the coil resistance for the CR motor and PF motor, sensor status , and Error codes and solution respectively.

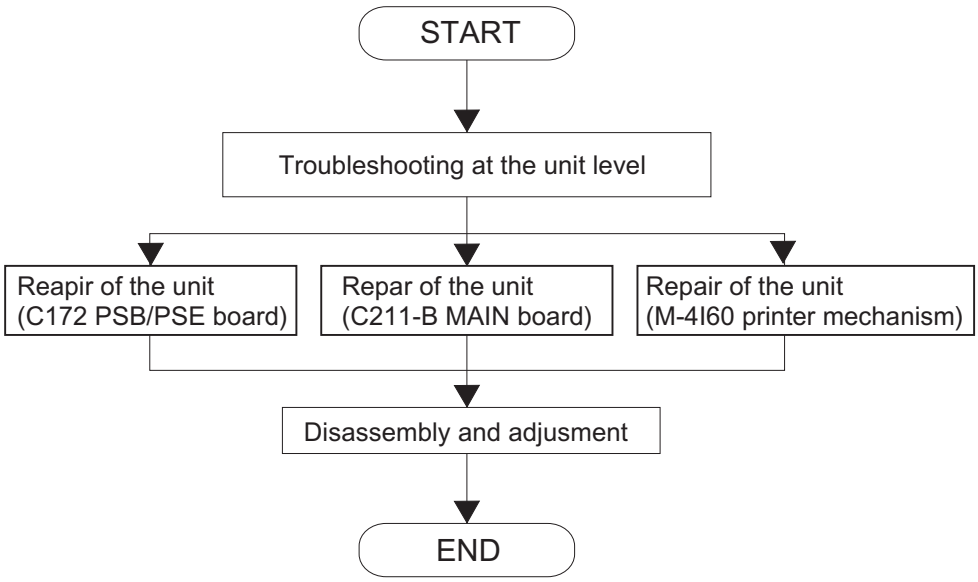


Figure 5-1. Troubleshooting Flowchart

Table 5-1. Coil Resistance for the Motors

Motor	**Connector No.**	**Test pin No.**	**Test method** (Set the multimeter to Ohms. Be sure to unplug the power cable from the AC inlet and disconnect the harnesses from the MAIN board.)	**Meter reading**
CR motor	CN14	Common pin :5, Test pins : 1, 2 3 and 4	Place one lead to the pin 5 and the other to each of the test pin 1, 2, 3 and 4 to check the coil resistance of each phase of the motor.	5Ω ± 7% (at 25••, per phase)
PF motor	CN15	Pin 1 and 3 or pin 2 and 4.	Place one lead to the Pin 1 or 2 and the other to the 3 or 4 to check the coil resistance of the phase 2 of the motor.	10Ω ±10 % (at 25••,)

Table 5-2. Sensor Status

Sensor	Test pin No.	Signal level	Sensor status
HP sensor	CN9/Pin 1 and Pin 2	Close (> 2.5V)	In the false absorbing position
		Open (< 2.5V)	Off the false absorbing position
Rear PE sensor	CN11/Pin 1	Open (H)	Paper loaded
		Close (L)	No paper loaded
Front PE sensor	CN10/Pin 1	Open (H)	Paper loaded
		Close (L)	No paper loaded
Release sensor	CN8/Pin 1	Open (H)	Friction feed mode
		Close (L)	Tractor feed mode
DE sensor	CN4/Pin 1	Open (H)	CR unit is on the pump side.
		Close (L)	CR unit is on the print side.
Black ink cartridge sensor	CN13/Pin 1	Open (H)	No black ink cartridge
		Close (L)	Black ink cartridge installed
Color ink cartridge sensor	CN12/Pin 1	Open (H)	No color ink cartridge
		Close (L)	Color ink cartridge installed
Cover open sensor	CN9/Pin 1	Open (H)	Cover closed
		Close (L)	Cover opened
Thermistor	CN12/Pin 2	Analog data	Approximately 10 kΩ at 24 ••

Table 5-3. Error Codes and Solutions

Printer status	Power	Pause	Cover open	Ink end (Black)	Ink end (Color)	Paper out	Solutions
Paper out	—	—	—	—	—	On	Load paper and press the Pause and Load/Eject buttons.
Paper jam	—	—	—	—	—	Blinks	Remove paper then press the Pause and Load/Eject buttons.
Cover open	—	—	On	—	—	—	Close the printer cover.
No black ink cartridge/black ink end	—	—	—	On	—	—	Replace the ink cartridge.
Black ink low	—	—	—	Blinks	—	—	Get a new cartridge ready.
No color ink cartridge/color ink end	—	—	—	—	On	—	Replace the ink cartridge.
Color ink low	—	—	—	—	Blinks	—	Get a new cartridge ready.
Fatal error	—	Blinks	Blinks	—	—	—	Turn the printer off and back on.
Release lever error	—	Blinks	—	—	—	Blinks	Set the release lever to the other position then remove the loaded paper and reset the release lever.
Maintenance requested (ink drain pads overflow)	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks	Replace the Ink drain pads and reset the EEPROM. (Refer to Section 1.4.3 and 3.2.9.)

5.2 Unit Level Troubleshooting

This section provides flowcharts which enables you to isolate the defective unit. Once the defective unit is identified by following the corresponding chart, refer to Section 5.3 and 5.4 to identify more specific part to be replaced at the component level.

Table 5-4. Symptom and Problem

Symptom	Problem	Flowchart No.
The printer does not operate at all.	■ No LED lights up. ■ The printer mechanism does not operate at all.	1
An error is indicated.	■ Error is indicated by LEDs.	2
Printing operation is abnormal.	■ Printing is not performed. ■ Printing result is abnormal. ■ Print quality is poor.	3
The printer feeds paper abnormally.	■ Paper feed is abnormal. ■ Paper is jamming. ■ The top edge of the paper is improperly positioned.	4
Control panel operation is abnormal.	■ Button operation has no affect on the printer.	5

1. The printer does not operate at all.

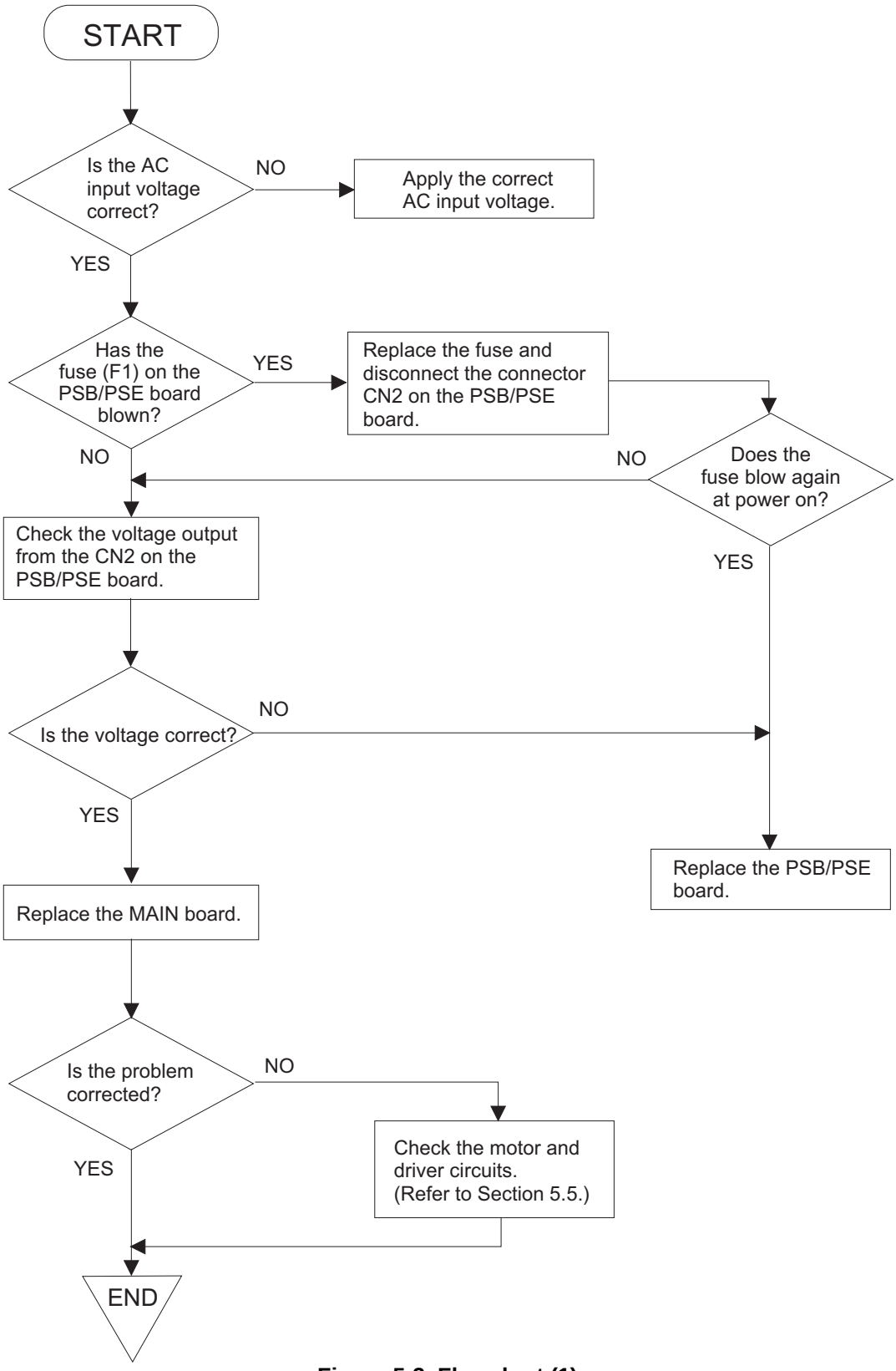


Figure 5-2. Flowchart (1)

2. An error is indicated.

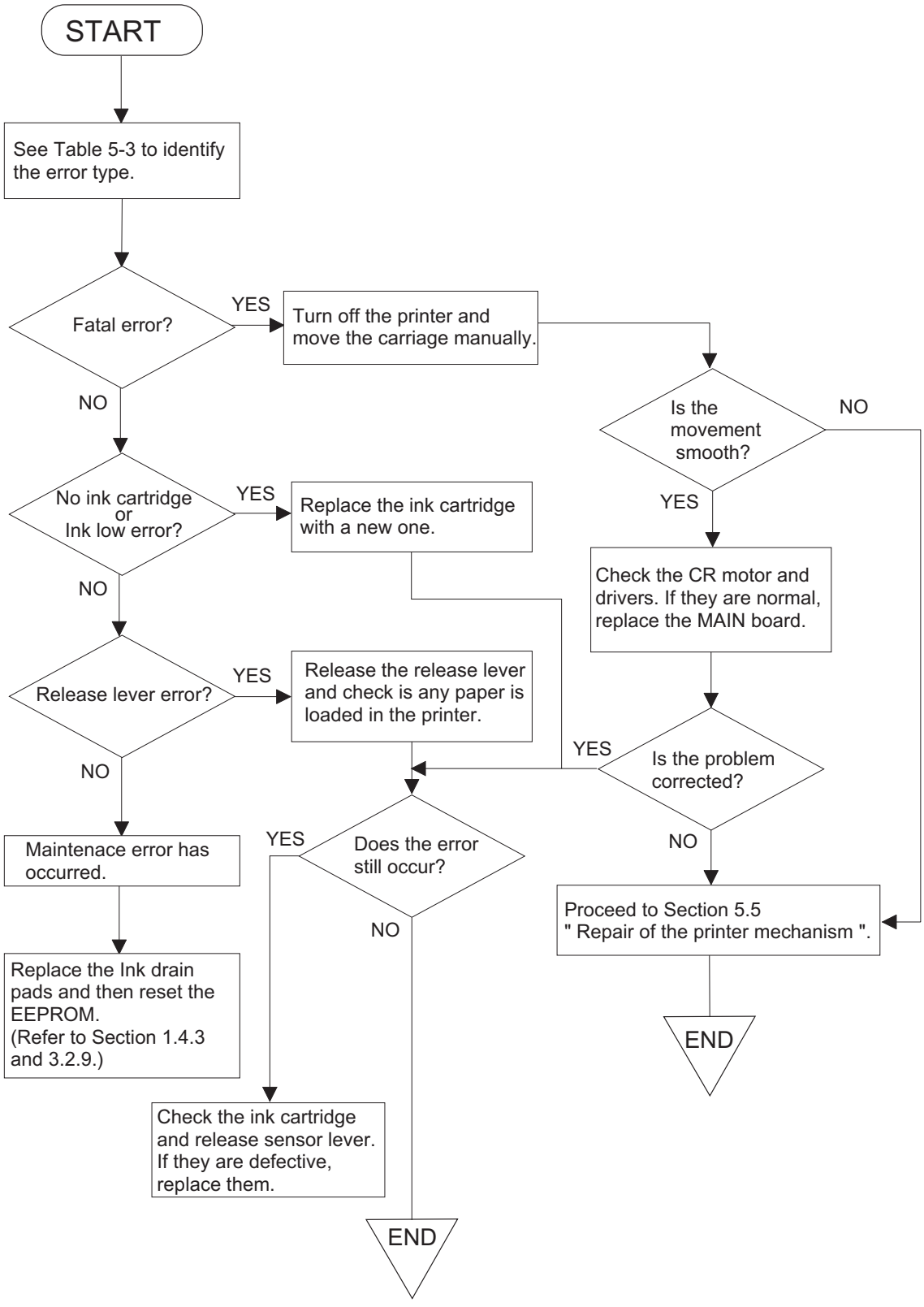

START
See Table 5-3 to identify the error type.
Fatal error?
YES
Turn off the printer and move the carriage manually.
NO
Is the movement smooth?
NO
YES
No ink cartridge or Ink low error?
YES
Replace the ink cartridge with a new one.
NO
Check the CR motor and drivers. If they are normal, replace the MAIN board.
Release lever error?
YES
Release the release lever and check is any paper is loaded in the printer.
NO
YES
Is the problem corrected?
NO
Maintenace error has occurred.
YES
Does the error still occur?
NO
Proceed to Section 5.5 " Repair of the printer mechanism ".
Replace the Ink drain pads and then reset the EEPROM. (Refer to Section 1.4.3 and 3.2.9.)
END
Check the ink cartridge and release sensor lever. If they are defective, replace them.
END

Figure 5-3. Flowchart (2)

3. Printing operation is abnormal.

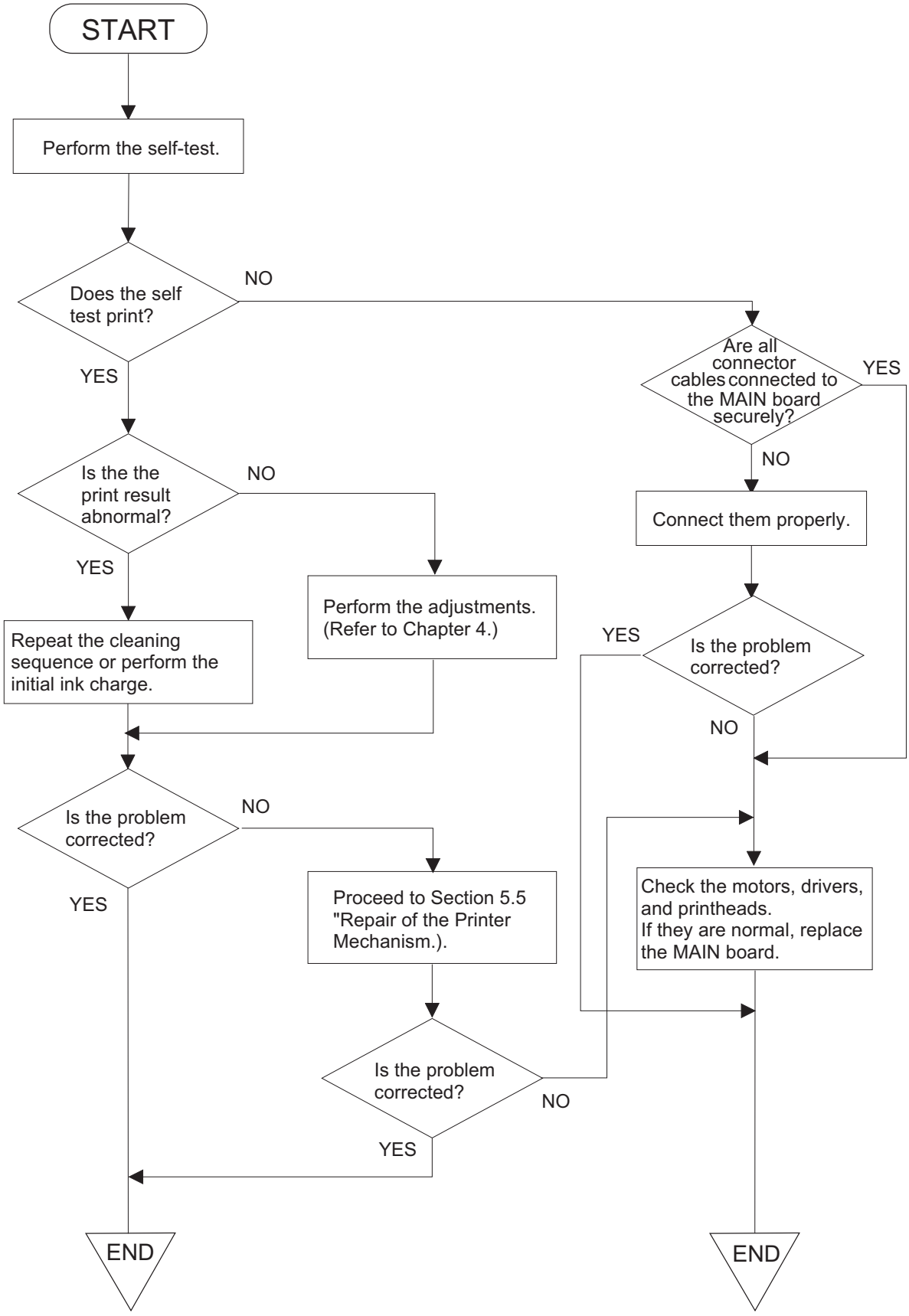


Figure 5-4. Flowchart (3)

4. The printer feeds paper abnormally

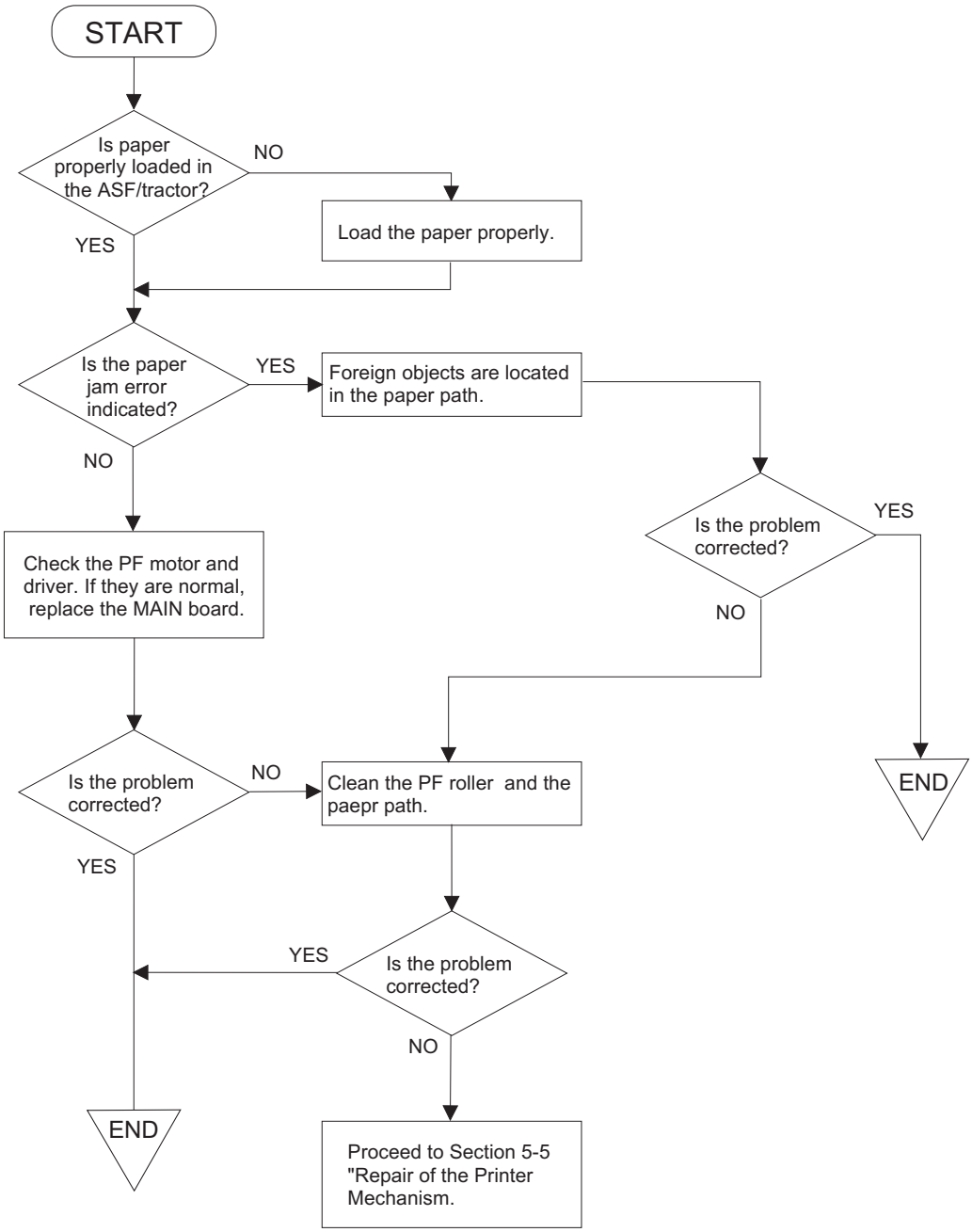


Figure 5-5. Flowchart (5)

5. Control panel operation is abnormal.

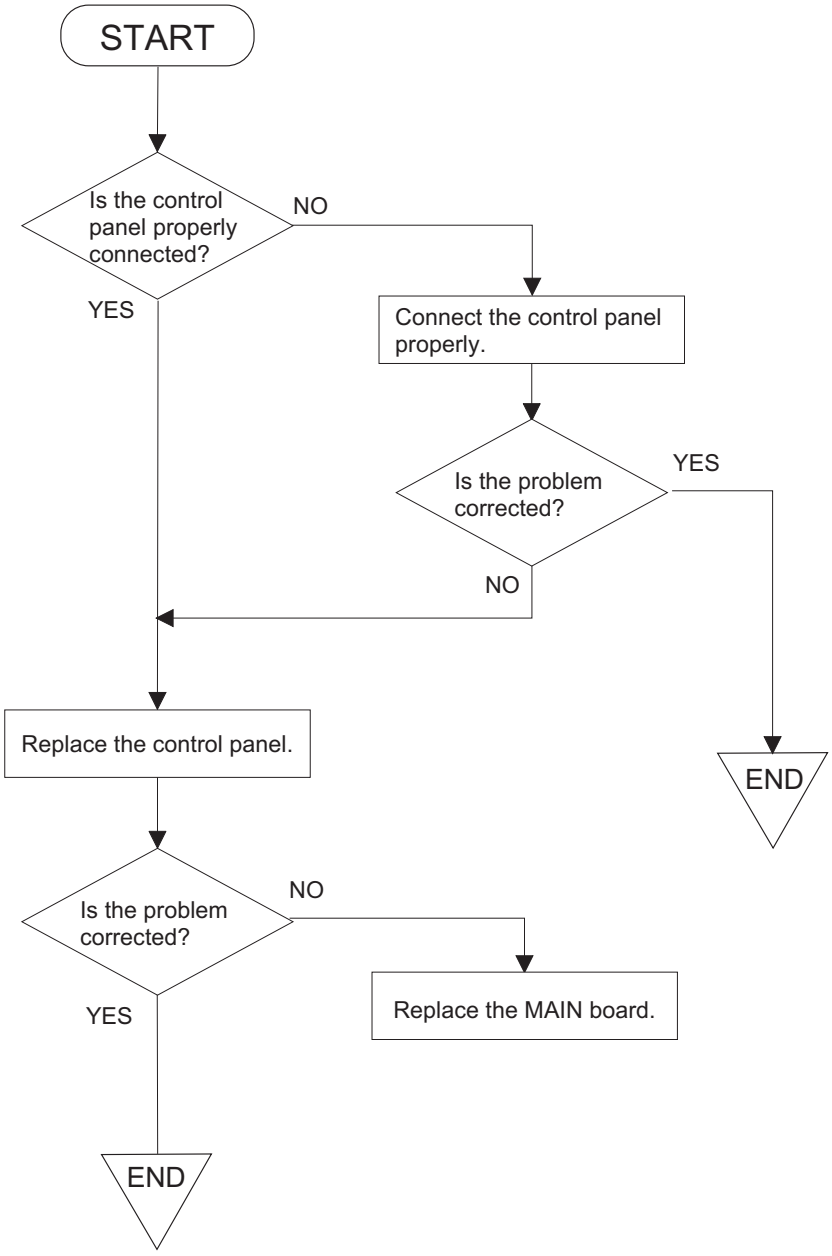
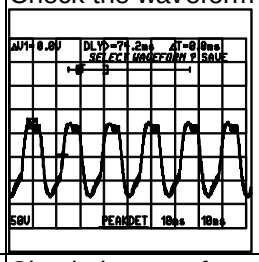
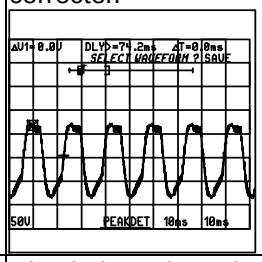
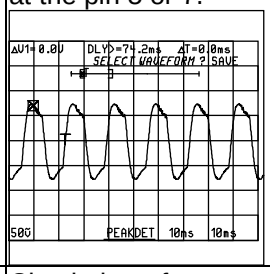
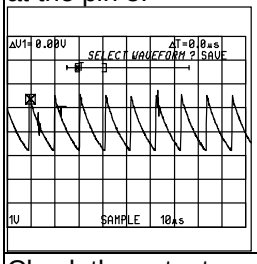
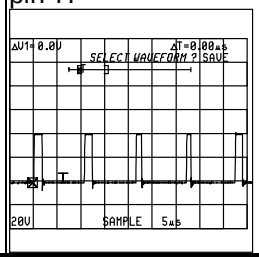


Figure 5-6. Flowchart (5)

5.3 Repair of the C172 PSB/PSE Board at Component Level

This section contains information which enables you to repair and replace the components on the electrical board (C172 PSB/PSE). Table 5-5 lists the potential causes for each symptom in order of possibility, with which you are able to find and repair the defective part.

Table 5-5. Component Repair of the C172 PSB/PSE Board

Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operate at all.	+42 VDC is not output.	Fuse (F1) is open.	Check visually if the fuse is normal.	Replace the fuse F1.
		Transformer (T1) is open.	Check the transformer using a multimeter.	Replace the transformer T1.
		Q1 is dead.	Check the waveform at drain. 	Replace the Q1.
		Q2 or Q3 is dead.	Check the waveform at corrector. 	Replace the Q2 or Q3.
		PC1 is dead.	Check the voltage in lowering at the pin 5 or 7. 	Replace PC1.
	+5 VDC is not output.	L4962 is dead.	Check the reference waveform at the pin 5. 	Replace the L4962.
			Check the output waveform at pin 7. 	

5.4 Component Repair of the C211 MAIN Board

This section provides information which enables you to repair and replace defective components on the C211-B MAIN board. Table 5-6 and 5-7 lists the causes for each symptom in order of possibility, with which you are able to find and repair the defective part.

Table 5-6. Component Repair of the C211 MAIN Board (1)

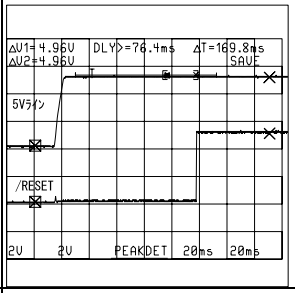
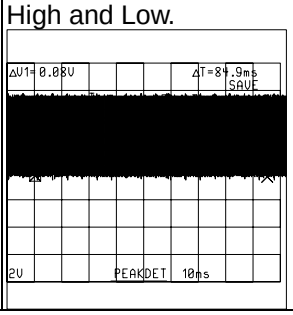
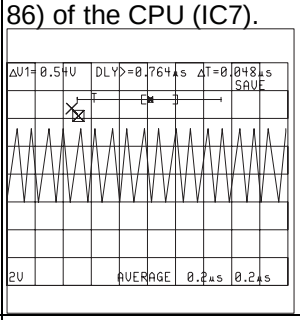
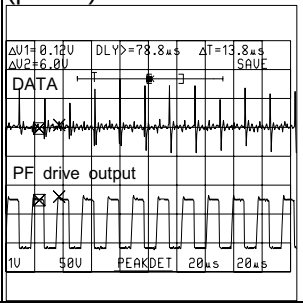
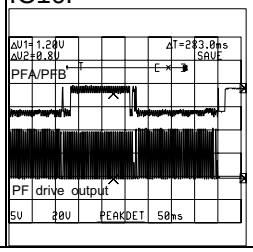
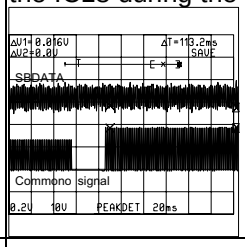
Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operate at all.	CPU doesn't operate. The driver mechanism doesn't operate properly at power on/off.	Reset circuit is defective.	Check the /RESET signal at the pin 1 and 5 V line at pin 3 of the IC1. 	Replace the MAIN board or the reset IC.
		Selection of ROM and sub gate array is abnormal.	Check the /CS1 (Pin 1) and /CS2 (pin 2) of the CPU (IC7) for the change in the signal High and Low. 	Replace the MAIN board.
		CG-ROM or PROM is defective.		Replace the MAIN board or PROM.
		CPU is defective.	Check the signal form of the XTAL (pin 85) and EXTAL (pin 86) of the CPU (IC7). 	Replace the MAIN board or CRU1.
CR does not operate normally.	CR motor does not rotate normally.	Sub gate array IC5 is defective.	Check the waveforms of DATA A (pin 6) or DATA B (pin 17) of the IC17. 	Replace the MAIN board or IC17.
	CPU is defective.			Replace the MAIN board.

Table 5-7. Component Repair of the C211 MAIN Board (2)

Symptom	Condition	Cause	Checkpoint	Solution
CR does not operate normally.	CR motor does not operate normally.	IC17 is defective.	Check the PF drive waveform output from the IC17.	Replace the IC17.
		CR motor is defective.	Check if the resistance of the motor coil is as follows; 5Ω ± 7 % at 25• •/phase (Refer to Table 5-1.)	Replace the CR motor.
The printer feeds paper abnormally.	PF motor does not operate normally.	Sub gate array IC16 is defective.	Check the waveform output from PFA0/1 (Pin 1 or 2) or PFB0/1 (Pin 23 or 24)of the IC16. 	Replace the MAIN board.
		CPU is defective.		Replace the MAIN board.
		IC16 is defective.	Check the waveforrm output from the A (pin 6), /A (pin 3), B (pin 8), or /B (pin 21) of the IC16. (Refer to the figure above.)	Replace the MAIN board.
		PF motor is defective.	Check if the resistance of the motor coil is as follows; 10Ω ± 10 % at 25• • (Refer to Table 5-1.)	Replace the PF motor.
Self-test does not perform printing.	—	Sub gate array IC6 is defective.	Check the waveform output from the SBDATA (pin 24) of the IC19 and SCDATA (pin 24) of the IC18 during the self-test. 	Replace the MAIN board.
		CPU is defective.	—	Replace the MAIN board.
		Common driver IC 18 and IC19 are defective.	Check the common signal waveform output from the pin 18, 19, or 20 of the CN13 or pin 20, 21 or 22 of the CN12. (Refer to the figure above.)	Replace the MAIN board or IC18 and IC19.
		Printhead is defective.	—	Replace the printhead.

⚠CAUTION

EEPROM must not be replace alone.

5.5 Repair of M-4I60 Printer Mechanism

This section provides information which allows you to repair and replace defective components of the M-4160 printer mechanism. Table 5-8, 5-9, and 5-10 contain various symptoms and the corresponding causes listed in order of possibility. Find the symptom in the table and troubleshoot the problem as instructed.

Table 5-8. Repair of M-4I60 Printer Mechanism (1)

Symptom	Condition	Cause	Checkpoint	Solution
CR unit operates abnormally.	Abnormal operation at power on.	Cleaner lever and CR are interfering with each other.	Check if the lock of the cleaner lever is released when the CR is on the paper feeding side.	Push the lever down manually to clear out the CR path.
Pump unit operates abnormally.	Abnormal rotation of the PF motor at power on.	Cam select assembly or cam change lever in the CR unit is defective.	Check if it's normally operating by performing cleaning and paper load/eject through the control panel operation.	Replace the cam select assembly or cam change lever in the CR unit.
		PF motor is defective.	Check if the resistance of the motor coil is as follows; 10 Ω ± 10 % at 25 •• (Refer to Table 5-1.)	Replace the PF motor.
Ink absorption is abnormal	Ink is not drained normally during a cleaning sequence is repeated. But it does not solve the dot missing problem.	Ink drain tube is caught in the cleaner lever of the pump unit.	Check if the tube is properly led.	Place the tube properly.
		The tube is disconnected from the cap.	Check if the tube is securely installed.	Install the tube securely.
		Ink drain tube is bent or damaged.	Check if the tubes in the pump unit and under the cap are deformed or damaged.	Replace the pump unit.
		The cap is damaged.	Check if the cap is damaged.	Replace the pump unit.
		The pump unit is damaged.	Rotate the pump unit manually and check if it rotates with the constant resistance, or check if it is damaged.	Replace the pump unit.
		Head unit is defective.	Check if signals are transferred to the head unit.	Replace the head unit.
CR motor operates abnormally .	Abnormal rotation at power on	Foreign objects are lodged in the CR mechanism.	Check visually if foreign objects are lodged.	Remove the foreign objects.
		CR motor is defective.	Check if the resistance of the motor coil is as follows; 5Ω •} 7% at 25•• per phase (Refer to Table 5-1.)	Replace the CR unit.
	CR motor rotates, but the CR unit Does not move.	The timing belt is damaged or dislocated.	Check if the timing belt is at the specified position in the CR unit.	Reinstall the timing belt properly.
			Check if the timing belt is deformed or some teeth are worn or broke off.	Replace the timing belt.
		CR motor driven pulley is damaged.	Check if the some teeth of the pulley are missing.	Replace the CR motor.

Table 5-9. Repair of M-4I60 Printer Mechanism (2)

Symptom	Condition	Cause	Checkpoint	Solution
CR motor operates abnormally	CR moves slightly at power on then stops.	CR does not move smoothly.	Move the CR manually and check if the movement is smooth.	Clean and lubricate the CR guide shaft. (Refer to Chapter 6.)
			Check if the tension of the belt is appropriate.	Replace the tension spring or timing belt.
			Check if the PG is proper.	Adjust the PG. (Refer to Chapter 4.)
Printing is not performed.	CR moves normally, but does not perform Printing.	The head FFC is disconnected from the head or MAIN board.	Check if the FFC is connected to the head and MAIN board.	Connect the FFC securely.
		The head FFC is damaged.	Check if there is current using the multimeter.	Replace the head FFC.
		The ink cartridge is defective.	It might have been removed and reinstalled several times by the user. Therefore install a new cartridge and run the self-test.	Replace the ink cartridge.
		The head is defective.	Repeat cleaning at least 3 times and check if the condition is improved. If not, replace the head unit and run the self-test.	Replace the head unit.
Printing operation is abnormal.	A particular dot does not print constantly.	Ink is not ejected straight or dot is missing because of ink viscosity.	Repeat cleaning sequence and run the self-test.	Clean the head surface.
		The head FFC is disconnected from the head or MAIN board.	Check if the FFC is connected to the head and MAIN board.	Connect the FFC securely.
		The head FFC is damaged.	Check if there is current using the multimeter.	Connect the FFC securely.
		The head is defective.	Repeat cleaning at least 3 times and check if the condition is improved. If not, replace the head unit and run the self-test.	Replace the head unit.
	Printing isn't performed occasionally.	Ink is not ejected straight or dot is missing because of ink viscosity.	Repeat cleaning sequence and run the self-test.	Clean the head surface.
		The head FFC is disconnected from the head or MAIN board.	Check if the FFC is connected to the head and MAIN board.	Connect the FFC securely.
		The head FFC is damaged.	Check if there is current using the multimeter.	Connect the FFC securely.
		The head is defective.	Repeat cleaning at least 3 times and check if the condition is improved. If not, replace the head unit and run the self-test.	Replace the head unit.
		The ink cartridge is defective.	Install a new cartridge and run the self-test. (The cartridge might have been removed and reinstalled several times by the user.)	Replace the ink cartridge.

Table 5-10. Repair of M4I60 Printer Mechanism (3)

Symptom	Condition	Cause	Checkpoint	Solution
Printing operation is abnormal.	A vertical line is not aligned.	Bi-D is not properly adjusted.	—	Perform the adjustments. (Refer to Chapter 4.)
	White banding problem occurs.	The head is defective.	Repeat cleaning at least 3 times and check if the condition is improved. If not, replace the head unit and run the self-test.	Replace the head unit.
		Paper feed mechanism doe not operate normally.	—	Replace the PF motor.
	Outline of the image is not clear. Color print is abnormal.	Head angular is not properly adjusted.	—	Perform the adjustment. (Refer to Chapter 4.)
		Head gap is not properly adjusted.	—	Perform the adjustment. (Refer to Chapter 4.)
		black/color head vertical is not properly adjusted.	—	Perform the adjustment. (Refer to Chapter 4.)
		The head unit is defective.	—	Replace the head unit.
Paper is fed abnormally.	Paper is not fed.	Foreign objects are lodged in the edge guide, PF roller, paper guide unit, and paper eject drive unit.	Turn the knob and check if the paper feed mechanism is normally functioning.	Remove the foreign objects.
		PF motor is defective.	Check if the resistance of the motor coil is as follows; 10 Ω •} 10% at 25 •• per phase (Refer to Table 5-1.)	Replace the PF motor.
	The top of the paper is not properly positioned.	Micro pearl of the glossy film remains on the PF roller, which gives the PF roller less grip.	Check if micro pearl is located on the PF roller.	Clean the PF roller.

CHAPTER 6
Maintenance

6.1 Cleaning 6-1

6.2 Service Maintenance 6-2

6.2.1 Head Cleaning 6-2

6.2.2 Maintenance Request 6-2

6.3 Lubrication and Adhesion 6-3

6.1 Cleaning

This chapter provides information on maintenance of this printer. This printer is basically designed to require no cleaning. It is, however, preferable to perform cleaning to preserve its function and output in the optimum quality for a long period of time. Therefore be sure to perform cleanings described in the following sections.

⚠WARNING

- ☑ *Be sure to unplug the AC power cable before cleaning the printer.*
- ☑ *Be careful not to get ink in your eyes. In case ink gets in your eyes, wash it away with fresh water and see a doctor.*
- ☑ *Follow the instructions below when handling the lithium battery installed on the C211 MAIN board.*
  - *Keep the battery away from any metal materials.*
  - *Ensure to mount the battery in the right direction. Otherwise it may result in explosion.*
  - *Do not heat up or burn the battery*

⚠CAUTION

- ☑ *Never apply thinner, trichloroethilene, and toner-based solvents. Use of a soft and dry cloth is recommended. In case stain adheres, use a cloth dumped with mild detergent.*
- ☑ *Do not use a hard brush for cleaning so as cases won't be damaged.*
- ☑ *Be careful not to damage any interior parts when cleaning inside the printer.*

⚠CAUTION

- ☑ *When transporting the printer, make sure that the ink cartridges are installed and the CR unit is fixed.*
- ☑ *ASP printer mechanism is not lubricated. Therefore be sure to apply lubricants to paper eject frame when replacing it.*

6.2 Service Maintenance

When an abnormal printing or the maintenance request error occurs, perform maintenance service described below.

6.2.1 Head Cleaning

In case abnormal printing result is identified, perform head cleaning sequence through the control panel operation. The head cleaning sequence is, however, automatically performed during printing operation to keep the printer in its best condition. The printer selects the most suitable cleaning sequence (including Flushing operation) referring to the printer condition.

1. Press the Pause button to put the printer into off-line status. (Pause LED goes off.)
2. Press the Shift and LF/FF buttons simultaneously for 2 seconds, and the printer enters the black cleaning mode. (Press Shift and Load/Eject buttons for the color head cleaning.) The printer automatically exits the cleaning mode and returns to off-line status.
3. Press the Pause button after the cleaning is executed, and the printer goes into the stand-by status.

⚠CAUTION

☑ *Do not perform cleaning unless the printing result is obviously abnormal.*

☑ *Excessive cleaning may shorten the carriage life.*

6.2.2 Maintenance Request

This printer monitors the capacity of ink drain pad for absorbing ink by counting amount of ink absorbed from the ink cartridge. When the ink drain pads are close to capacity, the maintenance request error is indicated. While the printer is in this status, it does not accept data from the host and any operation through the control panel except for power on/off is also ignored. In this case, perform EEPROM reset operation. (Refer to Section 1.4.3 in Chapter 1.)

⚠CAUTION

☑ *Be sure to replace the waste ink drain pads when performing EEPROM reset.*

6.3 Lubrication and Adhesion

of lubricant and adhesive has a considerable affect on the performance and durability of the printer, and specially lubrication at low temperatures r requires sensible selection of the lubricant. Therefore be sure to apply adequate lubricant specified by EPSON based on the analysis of technical information and result from the experimental use of lubricants and adhesives in wide range. Note the following when adhering;

- Clean the lubrication point prior to the operation.
- Lubricate the printer periodically as specified.
- Perform lubrication regardless of the specification when the printer needs oiling after cleaning, disassembling and assembling the printer for part replacement.
- Apply adhesive at a time of assembling the printer or replacing parts. Be sure to used adequate amount of adhesive and dry it thoroughly since overflow of surplus adhesive may cause malfunction to nearby parts.

⚠CAUTION

The lubricants and adhesives specified for this printer are selected based on the evaluation on the condition that they are used for this printer. Therefore never apply items which are not specified since use of other items might decrease printer life and printer performance.

Table 6- 1. Recommended Lubricants

Type	Product name	Content	Part Code	Applicability
Grease	G-26	40 g	B702600001	EPSON-exclusive product
Oil	O-8	40 g	1019753	EPSON-exclusive product
Adhesive	NEJI lock B1401B	1000 g	B730200200	EPSON-exclusive product

Table 6- 2. Lubrication Points and Application

Reference No.	Lubrication Points	Quantity
1	Shafts in the sub frame assembly (3 points)	G-26 (3-5 g)
2	Slopes of the select cam (2 points)	G-26 (3-5 g)
3	Front paper guide assembly (Sockets for the LD roller and the paper eject roller assembly, and the shaft for the gear (11.5.))	G-26 (3-5 g)
4	The shaft for the paper eject roller assembly	G-26 (3-5 g)
5	The sliding points of the paper eject drive unit and the PF roller shaft	G-26 (3-5 g)
6	The contact surface of the base frame with the tractor release shaft	G-26(3-5 g)
7	Contact points of the CR motor with the base frame assembly	G-26 (3-5 g)
8	The oil pad in the CR unit	O-8 (0.5 ml)
9	The slopes of the TR release cam	G-26 (3-5 g)
10	Top surface of the paper eject frame (8 points)	G-26 (10-20 mg)

Table6- 3. Adhesive Points

NO.	Adhesive Points
1	Contact point of the CR motor shaft with the CR motor fan
2	Right and left hexagon nuts on the edge guide unit

⚠CAUTION

Do not apply too much lubricant or adhesive, as it may cause malfunction.

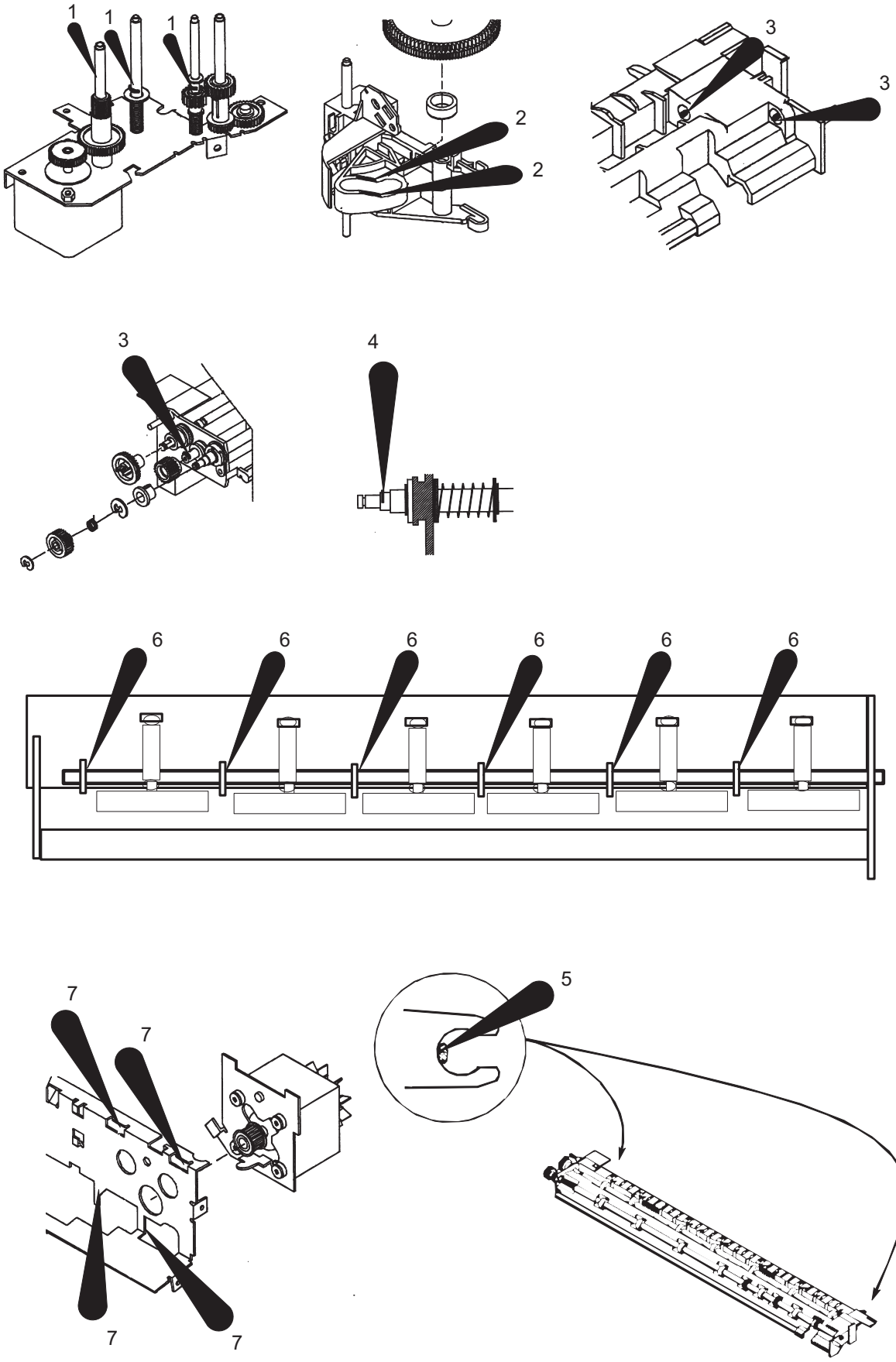


Figure 6-1. Lubrication Points (1)

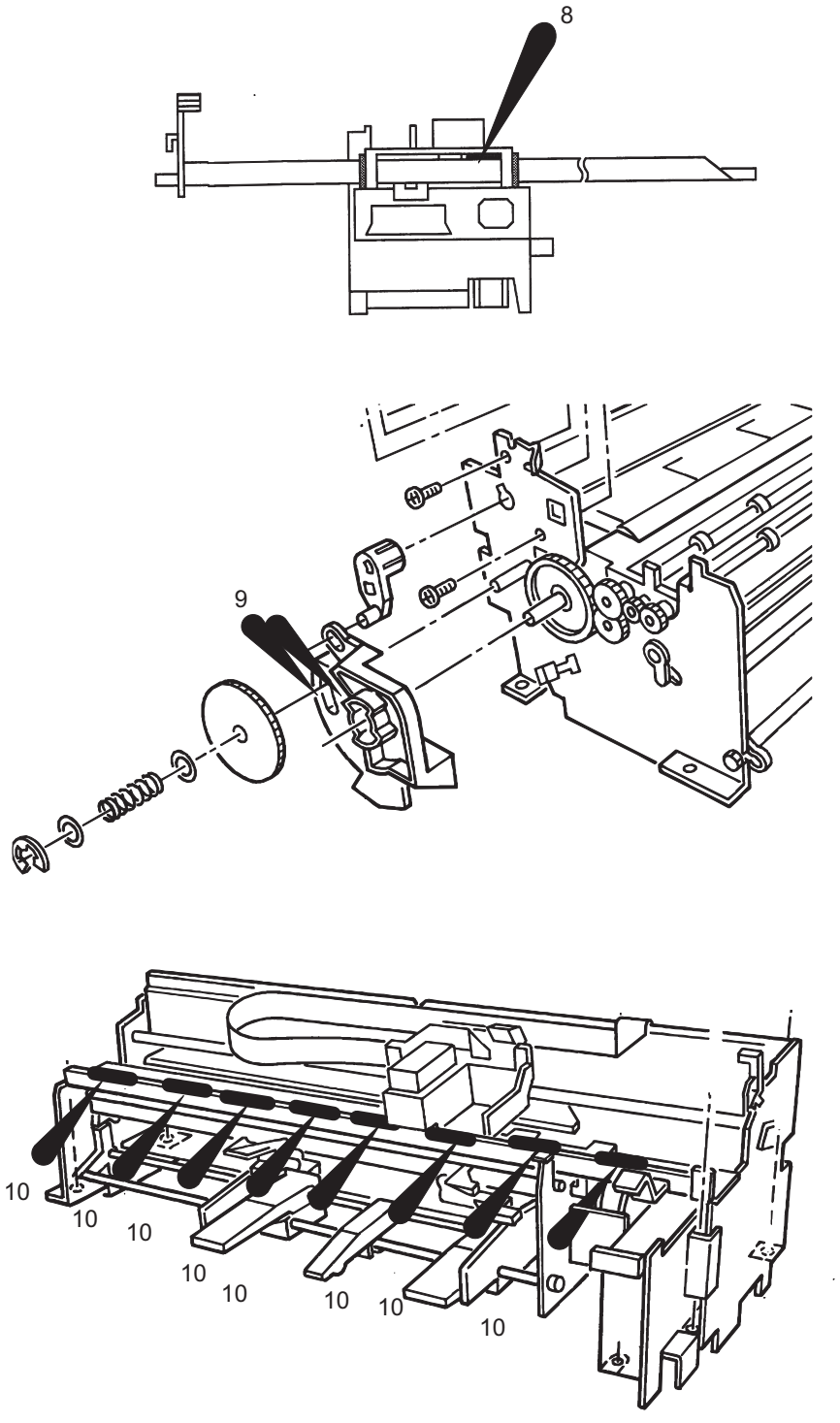


Figure 6-2. Lubrication Points (2)

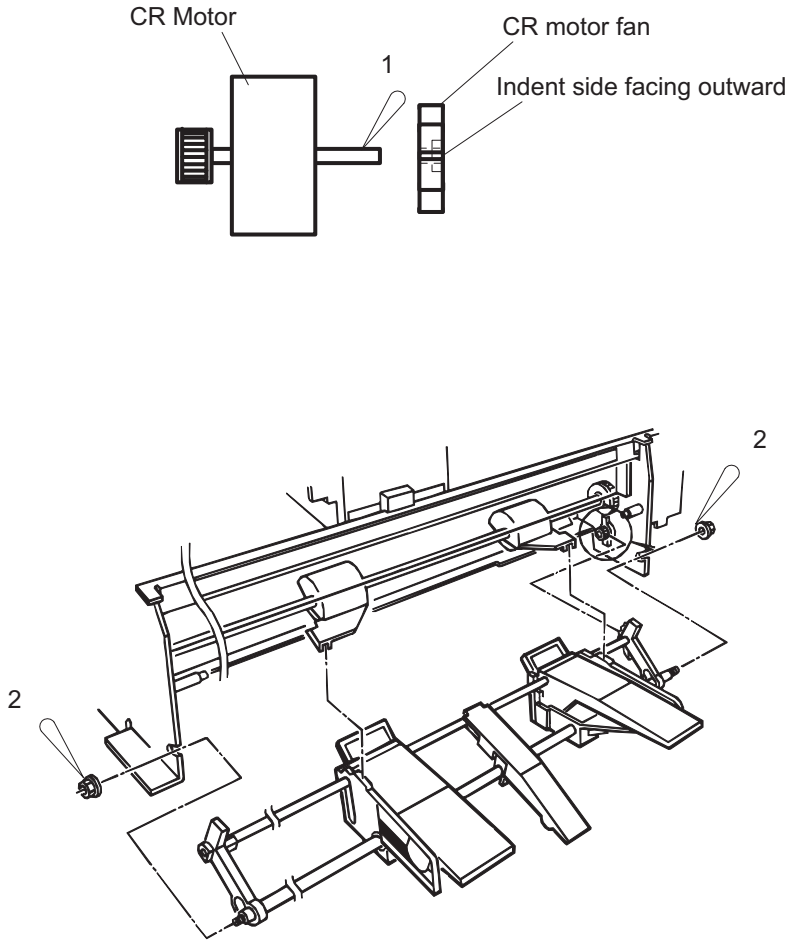


Figure 6-3. Adhesive Points

Appendix

A.1 Connector Summary.....A-1
A.1.1 Connector Pin Assignment.....A-2
A.2 Circuit Diagrams.....A-7
A.3 Component Layout.....A-13
A.4 Exploded Diagrams.....A-16
A.5 Parts List.....A-19
A.6 Dimension and Weight.....A-24

A.1 Connector Summary

Figure A-1 illustrates the interconnection of the main components.

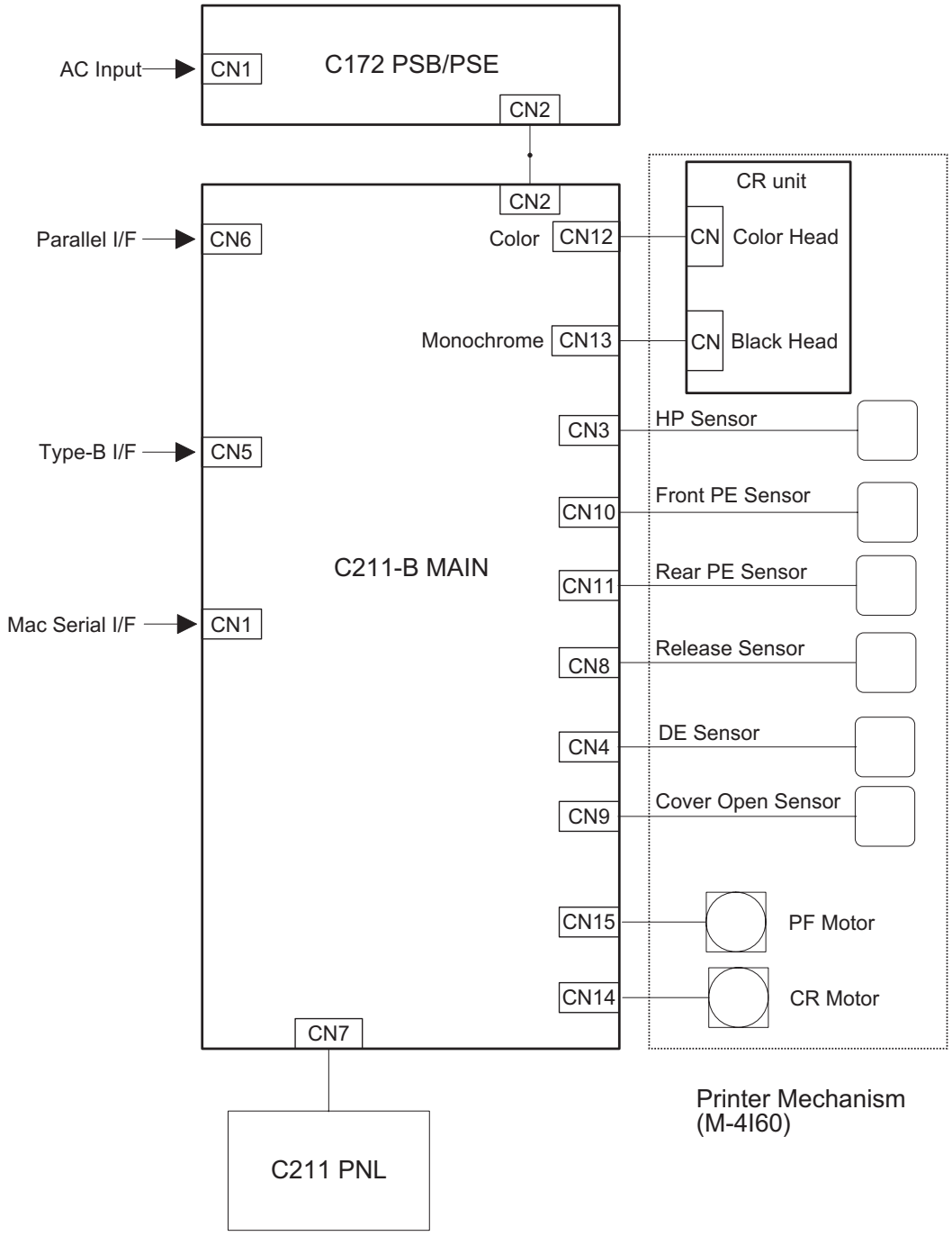


Figure A-A-1. Interconnection of the Main Components

A.1.1 Connector Pin Assignment

Table A-1 shows the locations an descriptions for the connectors on the circuit boards in this printer. Table from A-2 to A-13 show the pin assignment for each connector.

Table A-1. Connector Summary

Circuit Board	Connector No.	Pin No.	Description
C211 MAIN-B Board	CN1	8	Mac Serial I/F (Refer to Section 1.3.3.)
	CN2	9	DC input from the C172 PSB/PSE board Power off signal
	CN3	3	HP sensor
	CN4	2	DE sensor
	CN5	36	Type-B I/F (Refer to Section 1.3.4.)
	CN6	36	Parallel I/F (Refer to Section 1.3.1 and 1.3.2.)
	CN7	20	C211 PNL Board
	CN8	2	Release sensor
	CN9	2	Cover open sensor
	CN10	2	Front PE sensor
	CN11	2	Rear PE sensor
	CN12	24	Color head
	CN13	22	Black head
	CN14	5	CR motor
	CN15	4	PF motor
C172 PSB/PSE Board	CN1	2	AC power input
	CN2	9	DC power input
C172 PNL Board	CN1	20	To C211 MAIN-B board

Table A-2. Connector Pin Assignment (CN2)

Pin No.	I/O	Signal Name	Description
1	—	GND	Ground
2	—	+ 42	+ 42 VDC
3	—	+ 42	+ 42 VDC
4	—	GND	Ground
5	—	+ 5	+ 5 VDC
6	—	GND	Ground
7	O	PSC	Power off signal
8	—	GND	Ground
9	—	+ 5	+ 5 VDC

Table A-3. Connector Pin Assignment (CN3)

Pin No.	I/O	Signal Name	Description
1	O	SWA 0	HP sensor signal
2	—	+ 5	+ 5 VDC
3	—	GND	Ground

Table A-4. Connector Pin Assignment (CN4)

Pin No.	I/O	Signal Name	Description
1	O	SWA 1	DE sensor
2	—	GND	Ground

Table A-5. Connector Pin Assignment (CN7)

Pin No.	I/O	Signal Name	Description
1	—	GND	Ground
2	I	SWB1	
3	O	LED9	LED 9 DATA
4	O	LED8	LED 8 DATA
5	I	SWB2	
6	I	SWB5	
7	I	SWB0	
8	O	LED7	LED 7 DATA
9	O	LED6	LED 6 DATA
10	O	LED5	LED 5 DATA
11	—	+ 5	+ 5 VDC
12	O	LED1	LED 1 DATA
13	O	LED0	LED 0 DATA
14	I	SWB6	
15	I	PSC	Power scan signals
16	I	SWB3	
17	I	SWB4	
18	O	LED3	LED 3 DATA
19	O	LED2	LED 2 DATA
20	O	LED4	LED 4 DATA

Table A-6. Connector Pin Assignment (CN8)

Pin No.	I/O	Signal Name	Description
1	I	SWA 1	Release sensor signal
2	—	GND	Ground

Table A-7. Connector Pin Assignment (CN 9)

Pin No.	I/O	Signal Name	Description
1	I	SWA 0	Cover open sensor signal
2	—	GND	Ground

Table A-8. Connector Pin Assignment (CN 10)

Pin No.	I/O	Signal Name	Description
1	I	PE_F	Front PE sensor signal
2	—	GND	Ground

Table A-9. Connector Pin Assignment (CN11)

Pin No.	I/O	Signal Name	Description
1	I	PE_R	Rear PE sensor signal
2	—	GND	Ground

Table A-10. Connector Pin Assignment (CN12)

Pin No.	I/O	Signal Name	Description
1	I	CCO	Cartridge sensor signal
2	I	THS	Thermistor signal
3	—	GND	Ground
4	O	CHLAT	Latch signal
5	—	GND	Ground
6	O	CHDATA	Cyan data
7	—	GND	Ground
8	O	MHDATA	Magenta data
9	—	GND	Ground
10	O	YHDATA	Yellow data
11	—	GND	Ground
12	O	CHCLK	Clock signal
13	—	GND	Ground
14	O	CHNCHG	NCHG signal
15	—	GND	Ground
16	—	+ 5	Power source
17	—	GND	Ground
18	—	GND	Ground
19	—	GND	Ground
20	O	COM	Common output
21	O	COM	Common output
22	O	COM	Common output
23	—	VHPR	Drive voltage
24	—	VHPR	Drive voltage

Table A-11. Connector Pin Assignment (CN13)

Pin No.	I/O	Signal Name	Description
1	I	BCO	Cartridge sensor signal
2	—	GND	Ground
3	—	GND	Ground
4	O	BLAT	Latch signal
5	—	GND	Ground
6	O	BSI 2	Data
7	—	GND	Ground
8	O	BSI 1	Data
9	—	GND	Ground
10	O	BHCLK	Clock signal
11	—	GND	Ground
12	O	BHNCHG	NCHG signal
13	—	GND	Ground
14	—	+ 5	Power source
15	—	GND	Ground
16	—	GND	Ground
17	—	GND	Ground
18	O	COM	Common output
19	O	COM	Common output
20	O	COM	Common output
21	—	VHPR	Drive voltage
22	—	VHPR	Drive voltage

Table A-12. Connector Pin Assignment (CN14)

Pin No.	I/O	Signal Name	Description
1	O	A	Phase A output
2	O	/ A	Phase / A output
3	O	B	Phase B output
4	O	/ B	Phase / B output
5	—	+42	Drive signal

Table A-13. Connector Pin Assignment (CN15)

Pin No.	I/O	Signal Name	Description
1	O	A	Phase A output
2	O	B	Phase B output
3	O	/ A	Phase / A output
4	O	/ B	Phase / B output

A.2 Circuit Diagrams

Figure A-A-2. C211 MAIN-B Board Circuit Diagram (1/2)

Figure A-A-3. C211 MAIN-B Board Circuit Diagram (2/2)

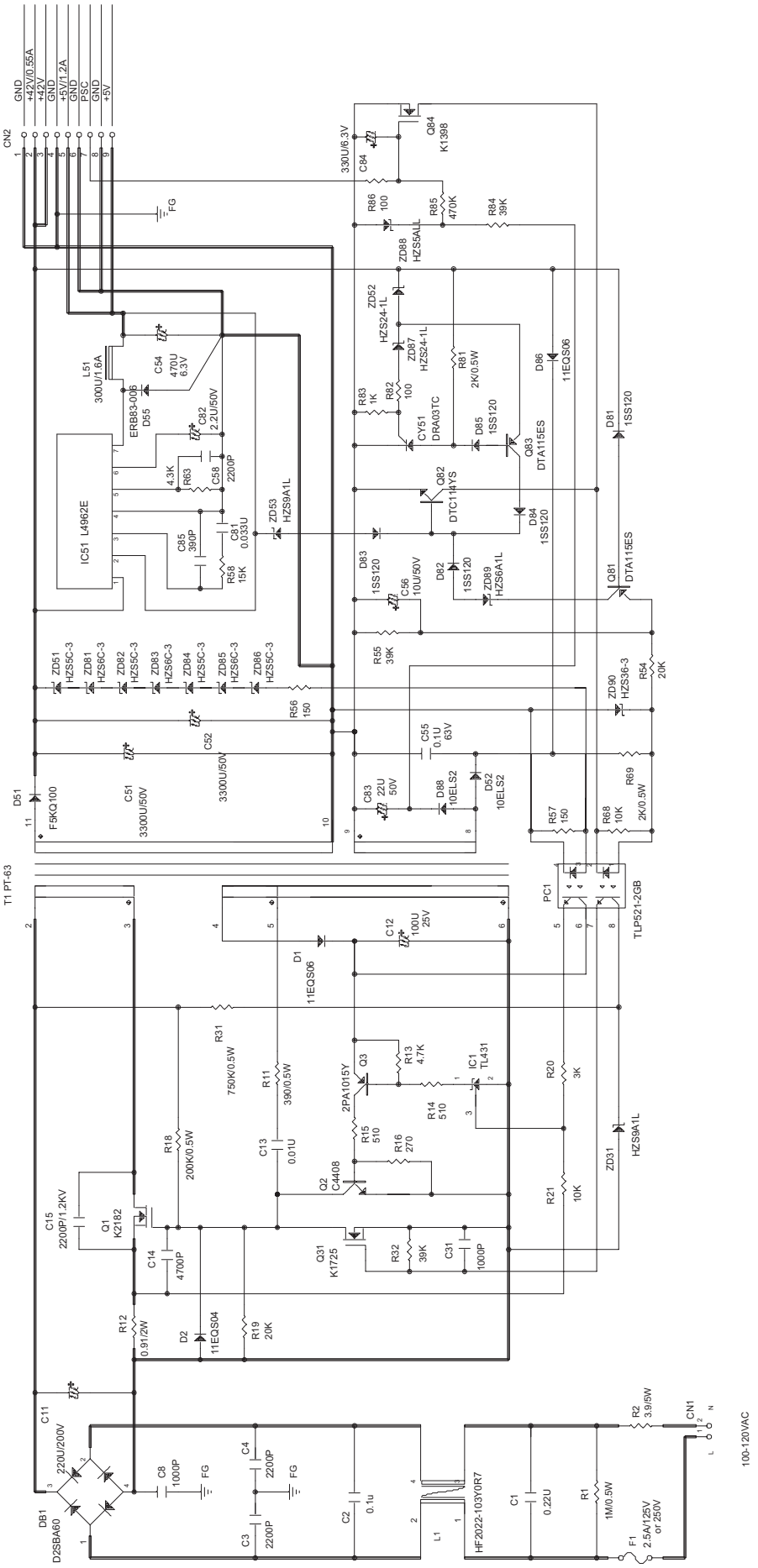


Figure A-A-4. C172 PSB Board Circuit Diagram

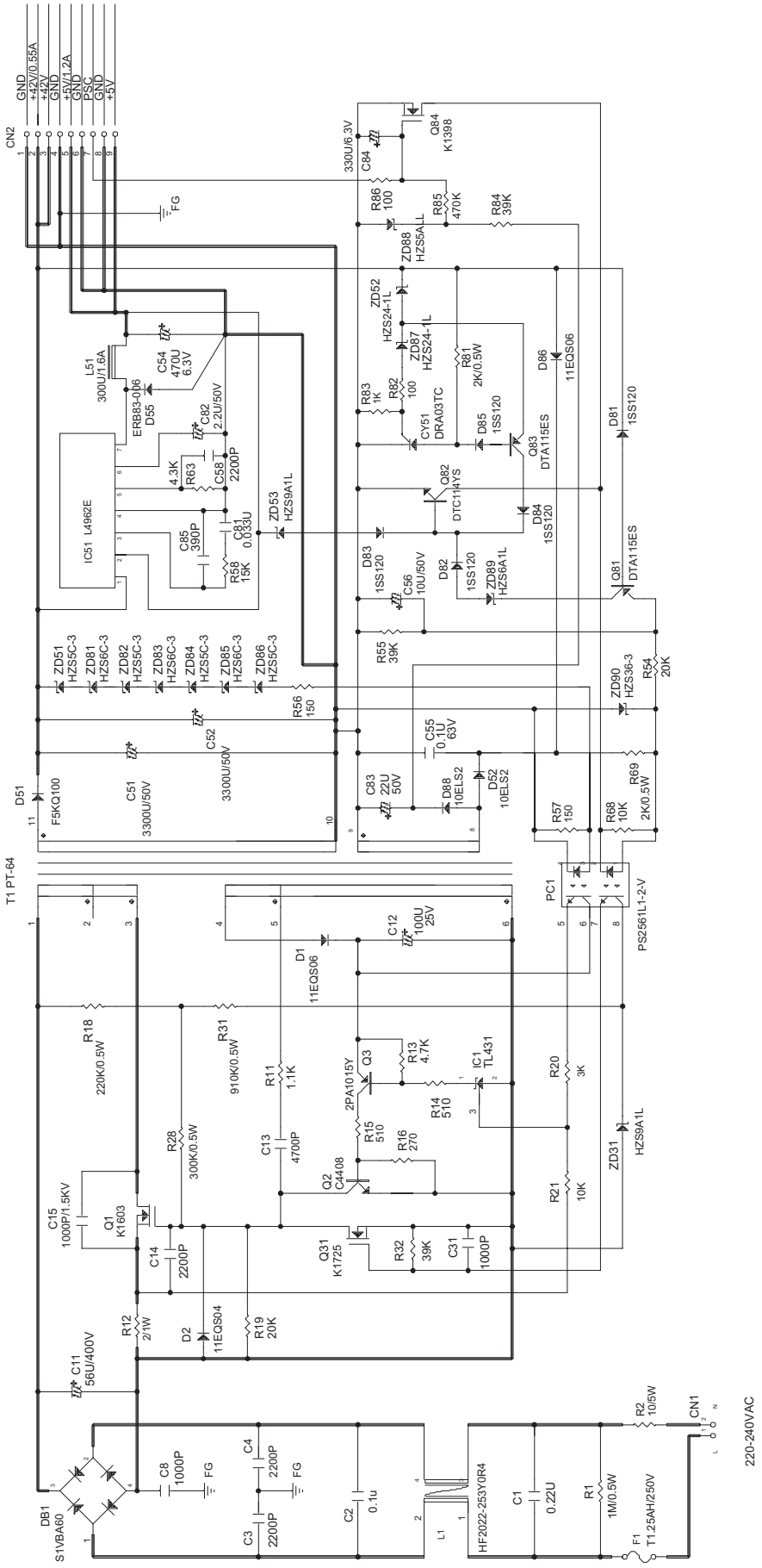


Figure A-A-5. C172 PSE Board Circuit Diagram

A.3 Component Layout

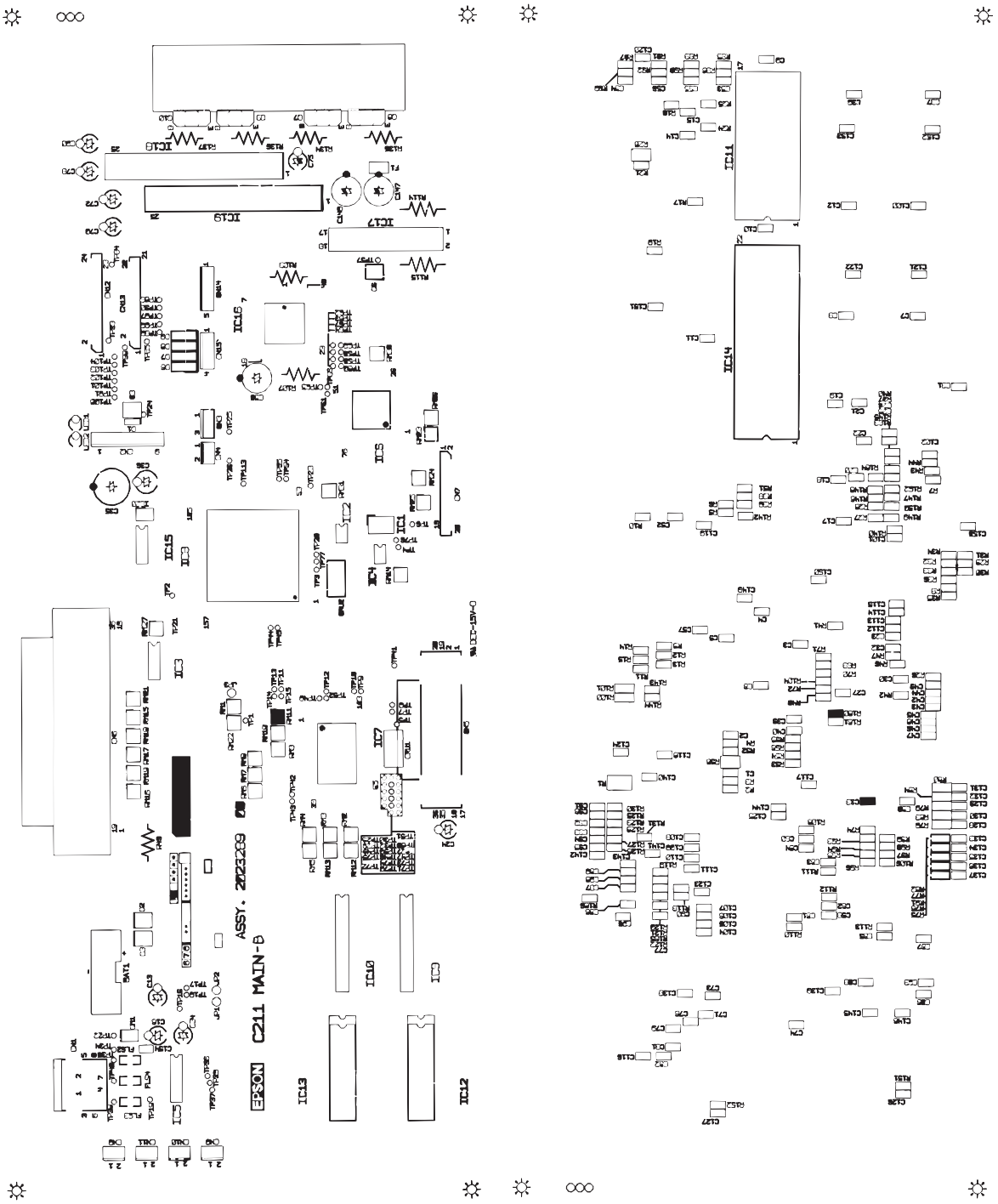


Figure A-A-6. C211 MAIN-B Board Component Layout

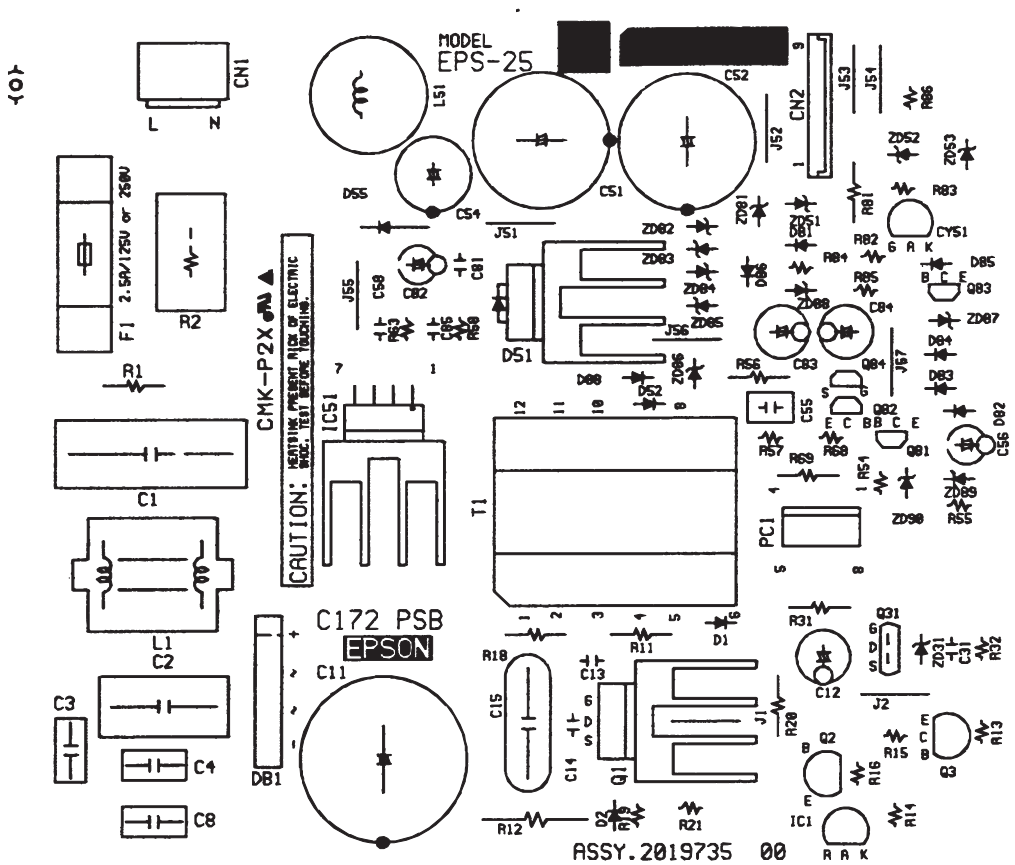


Figure A-A-7. C172 PSB Board Component Layout

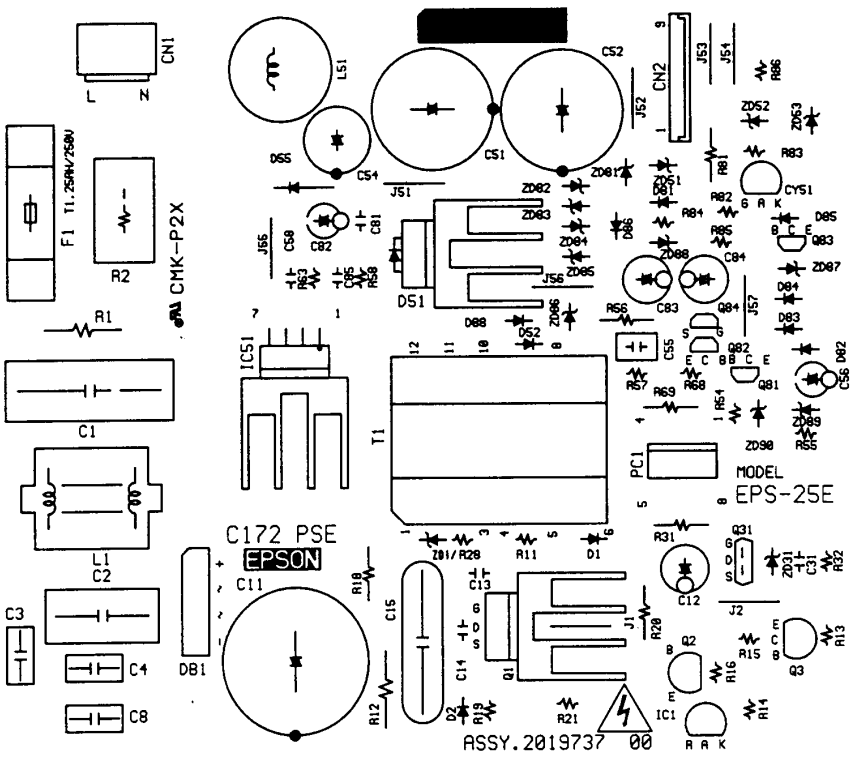


Figure A-A-8. C172 PSE Board Component Layout

A.4 Exploded Diagrams

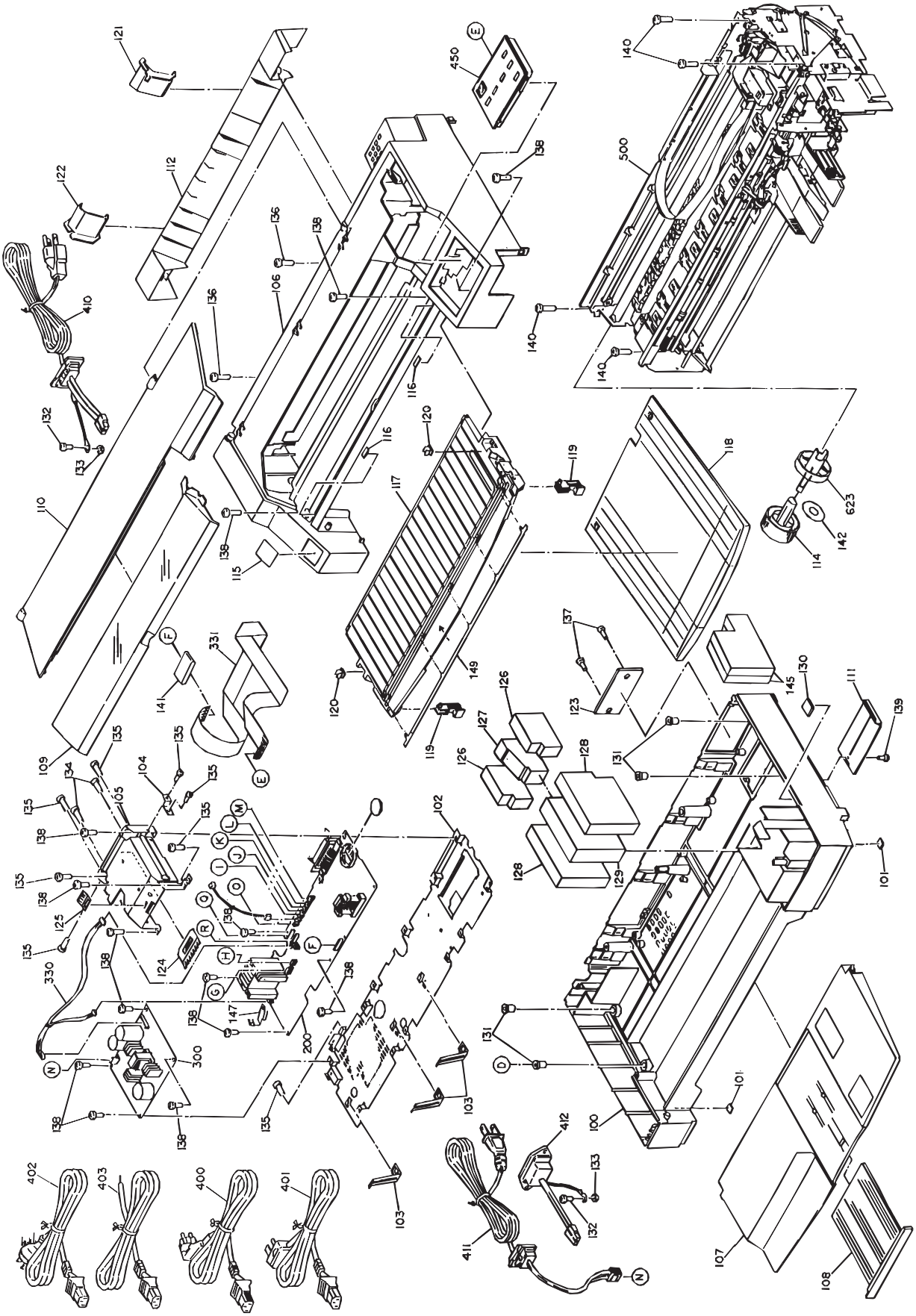


Figure A-A-9. Stylus COLOR 1520 Exploded Diagram (1)

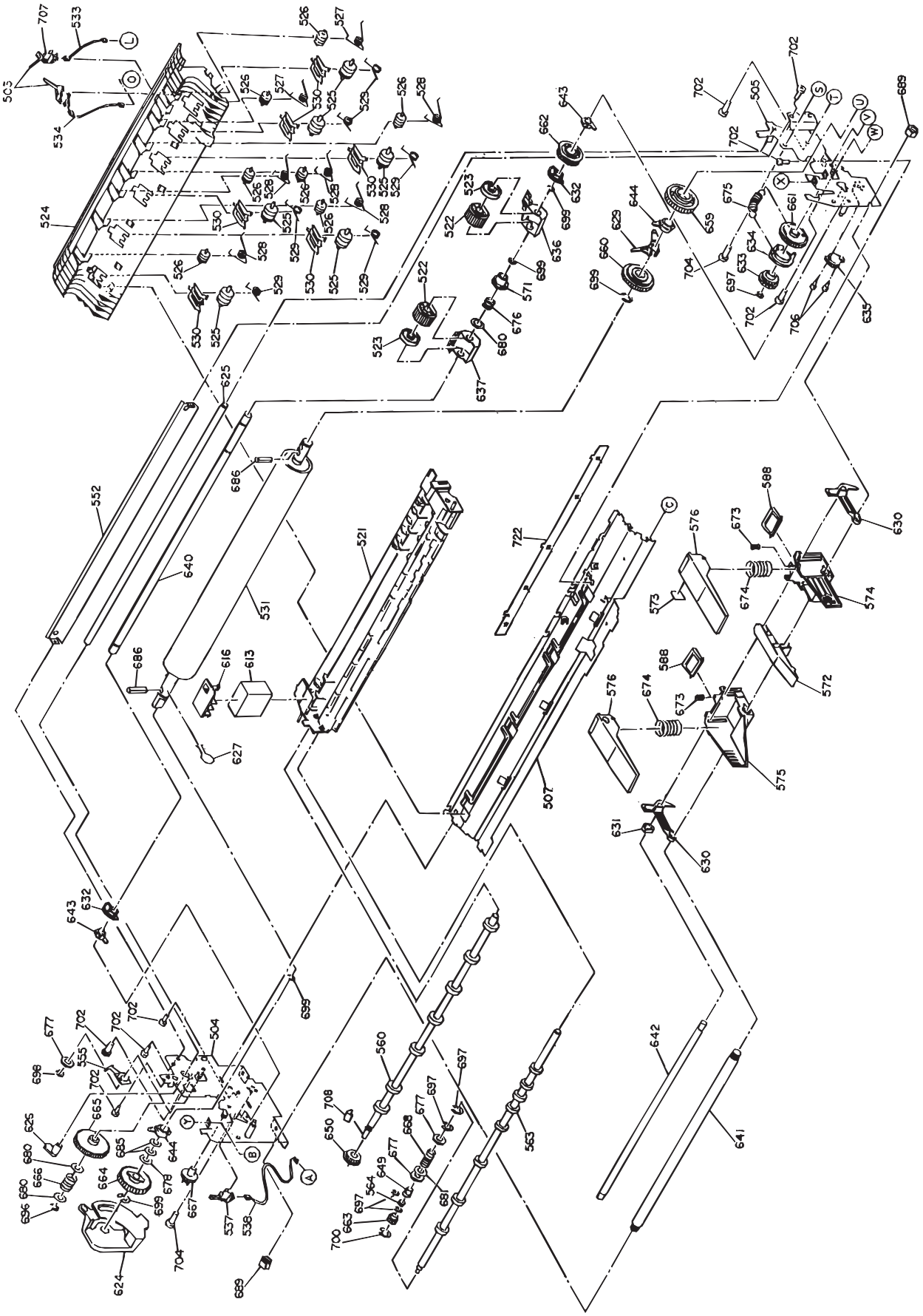


Figure A-A-10. Stylus COLOR 1520 Exploded Diagram (2)

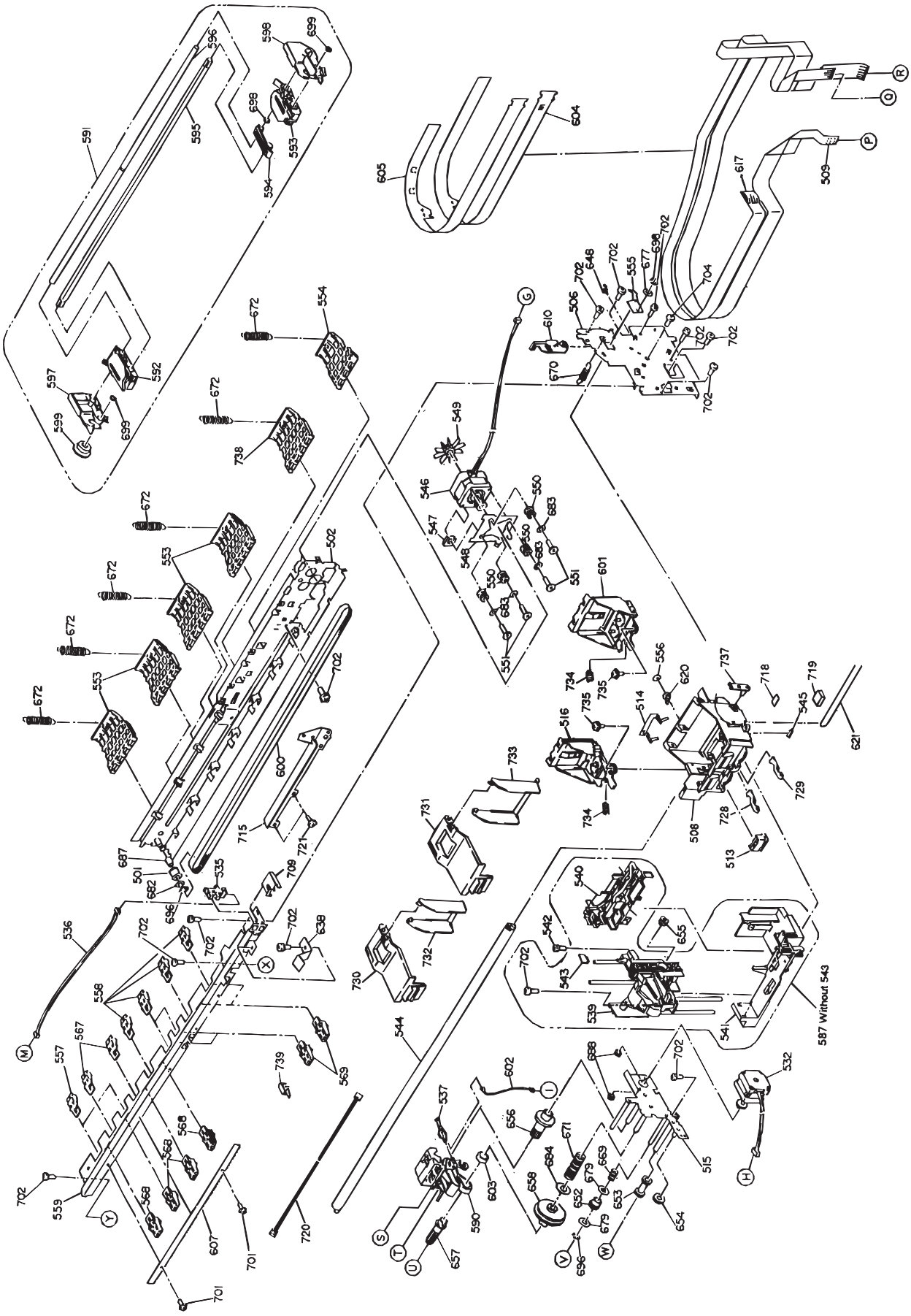


Figure A-A-11. Stylus Color 1520 Exploded Diagram (3)

A.5 Parts List

Table A-14. Part No. Reference Table (1)

Reference No.	Description	Part Number
100	Lower Housing	1031901
101	Foot	1004605
102	Shield Plate	1031903
103	Grounding Plate	1026160
104	Grounding Plate;B	1027139
105	Type-B I/F Shield Plate	1031912
106	Upper Housing	1031900
107	Paper Support	1026167
108	Edge Guide	1026174
109	Printer Cover	1034395
110	Printer Cover	1031902
111	ROM Cover	1031904
112	Rear Guide Sheet	1026171
114	Knob	1026173
115	Logo Plate;B	1033905
116	Damper Sheet	1026747
117	Output Tray	1034105
118	Stacker Support	1026169
119	Stacker Lever	1026745
120	Stacker Hook	1026746
121	Right Rear Edge Guide	1027843
122	Left Rear Edge Guide	1027844
123	Upper Connector Cover	1002045
124	Type-B Grounding Spring	1012855
125	Earth Spring	1026162
126	Waste Ink Drain Pad	1025948
127	Waste Ink Drain Pad	1025960
128	Waste Ink Drain Pad	1025962
129	Waste Ink Drain Pad	1025988
131	Clamp	1002902
132	Screw (CB(0))	B045800115
133	Hexagon Nut	B070200411
134	Screw (CP)	B010103311
135	Screw (CBS, 3X6)	B300204211
136	Screw (CBB, 4X20)	B310206711
137	Screw (CBS, 3X12)	1002674
138	Screw (CBP Tite 3X12 F/ZN)	1003164
139	Screw (CBS)	B300204311
140	Screw (CBS, 4X14)	1020333
141	Ferrite Core	2018129
142	Knob Sheet	1028431
145	Waste Ink Drain Pad	1031897
147	Connector Shield Plate	1031908
149	Lower Gutter Blade Guide Plate	1034107
180	Caution Label	1034070
183	Paper Set Label	1034087
185	Center Support Label	1034074
186	A3 Label	1034082
187	Adjust Lever Label	1034078
188	Edge Guide Label	1034086
200	MAIN Board Assembly	2023288 FOR USA. S.E.ASIA, OCEANI
200	MAIN Board Assembly	BOARD ASSY., MAIN FOR EUROPE
300	PSB Board Assembly	2019735 POWER SUPPLY (120 V)

Table A-15. Part No. Reference Table (2)

Reference No.	Description	Part Price List Name
300	PSE Board Assembly	2019737, POWER SUPPLY (220V/240V)
330	Connector Cable	2023503
331	Connector Cable	2019681
400	Power Cable	2002364 (VD31303SA-10A)
401	Power Cable	2006741(BS31303SA-SR-10A)
402	AC Cable	2010468
403	Power Cable	2002365
410	Power Cable Assembly.	2020274
411	Power Cable Assembly	20140229
412	Wire Harness	2012926
450	Panel Board Assembly	BOARD ASSY. PANEL
500	M-4I60 Printer Mechanism	2024057
501	Sub Pulley	1026001
502	Base Frame Assembly	1026296
503	PE Sensor	2014138
504	Left Frame Assembly	1032549
505	Middle Frame Assembly	1026294
506	Right Frame Assembly	1031871
507	Bottom Maim Frame	1031873
508	CR /Carriage	1031875
509	Color Head Cable	1031879
513	CR Slider	1031877
514	Head Grounding Plate	1031876
515	Sub Frame Assembly	1026295
516	Printhead	F055000
521	Front Paper Guide	1031859
522	Paper Load Roller Assembly	1019407
523	LD Support Roller	1019387
524	Rear Paper Guide	1026031
525	PF Support Roller Assembly	1033228
526	Support Driven Roller Assembly	1033229
527	Torsion Spring	1026986
528	Torsion Spring	1027828
529	Torsion Spring	1027829
530	PF Support Holder	1019356
531	PF Drive Roller	1031896
532	PF Motor Assembly	2023147
533	Rear PE Connector Cable	2019713
534	Front PE Connector Cable	2023231
535	HP Sensor	2021854
536	Connector Cable for the HP Sensor	2019542
537	Leaf Sensor B1	2014283
538	Platen Harness	2004015
539	Pump Assembly	1032548
540	Cap Assembly	1032547
541	Pump Mounting Plate	1025954
542	Screw (CBP, 3x10)	1012350
543	ASP Head Cleaner	1034969
544	CR Guide Shaft	1031872
545	Oil Pad	1030382
546	CR Motor Assembly	2023615
547	CR Motor Grounding Plate	1012616
548	CR Motor Mounting Plate	1026000
549	CR Motor Fan	1030325
550	CR Damper	1012618
551	CR Shaft Damper B	1017596

Table A-16. Part No. Reference Table (3)

Reference No.	Description	Part Price List Name
552	Paper Load Guide Frame	1025933
553	Driven Roller Assembly	1034053
554	Driven Roller Assembly B	1034054
555	Parallelism Adjust Bushing	1025929
556	Change Lever Bushing	1023980
557	Paper Eject Holder Assembly D	1033936
558	Paper Eject Holder Assembly B	1032983
559	Paper Eject Frame	1031860
560	Paper Eject Roller	1031866
563	Paper Eject Roller Assembly	1031928
564	Paper Out Clutch	1026103
567	Paper Eject Holder Assembly C	1033935
568	Paper Eject Holder Assembly	1032545
569	Paper Eject Holder Assembly B	1034967
572	Middle Edge Guide Assembly	1027610
573	Edge Guide Label	1027313
574	Right Edge Guide Assembly	1026305
575	Left Edge Guide Assembly	1026306
576	Hopper Assembly	1026304
587	Pump Cap Mounting Plate Assembly	1032546
588	Pad Holder Assembly	1026302
590	Cam Select Assembly	1032972
591	Tractor Assembly	1026308
592	Left Tractor	1025293
593	Right Tractor	1025294
594	Paper Support	1025296
595	Tractor Drive Shaft	1026114
596	Tractor Guide Shaft	1026115
597	Left Tractor Frame	1026120
598	Right Tractor Frame	1026121
599	Gear 25	1026117
600	Timing Belt	1026004
601	Printhead	F056000
602	Connector Cable for the DE Sensor	2019712
603	DE Gear Bushing	1026061
604	FFC Holder	1031881
605	FFC Holder	1031882
606	Anti Static Bush	1031867
610	PG Adjust Lever	1031874
613	Left Ink Drain Pad	1025989
616	Ink Pad Cover	1032161
617	Black Cable Head	1031880
620	Cam Change Lever	1026019
621	Change Lever Spring	1026020
623	Release Lever	1026042
624	Tractors Release Cam	1026043
625	Tractor Release Shaft	1026044
626	Tractor Support Release Cam	1026046
627	Roller Grounding Spring	1026047
629	Trigger Lever	1026059
630	Transmission Release Lever	1034670
631	ASF Release Shaft Bushing	1026076
632	ASF Release Cam	1026078
633	Transmission ASF Ratchet	1026080
634	Clutch Cam	1026084
635	Damper	1026085

Table A-17. Part No. Reference Table (4)

Reference No.	Description	Part Price List Name
636	Right Slide Cover	1026106
637	Left Slide Cover	1026107
640	Paper Load Shaft	1026062
641	Guide Edge Shaft	1026068
642	ASF Release Shaft	1026069
643	Platen Shaft Holder	F334005230
644	Platen Shaft holder	F334005370
648	Wire Saddle	1003192
649	Bushing 6	1019437
650	Gear 16	1031864
652	Gear 11.4	1025967
653	Combination Gear 13.8, 11	1025968
654	Gear 17	1025969
655	Gear 12	1025970
656	Combination Gear 22, 8.4	1026049
657	Gear 8	1026050
658	Combination Gear 48, 45	1026051
659	Gear 33.6	1033679
660	Gear 24	1026055
661	Gear 29	1026081
662	LD Gear	1026083
663	Gear 14.5	1031865
664	Gear 40	1026111
665	Gear 46	1026112
666	Compression Spring 1.96	1026119
667	Gear 16.5	1026254
668	Compression Spring 450	1020350
669	Compression Spring 0.39	1032065
670	Extension Spring 23.2	1026003
671	Compression Spring 0.65	1034197
672	Extension Spring 7.63	1026040
673	Compression Spring 1.13	1026072
674	Compression Spring 2.16	1027830
675	Extension Spring 0.698	1027885
677	Plain Washer	B100154712
678	Plain Washer	B100166012
679	Plain Washer	B100167090
681	Plain Washer 6.1X0.3X12, L/NA	1020296
682	Plain Washer 4.2X0.3X8, L/N	1006142
683	Plain Washer, 3X0.5X8 F/ZN	1008492
684	Plain Washer 5.32X0.6X17.6 F/ZN	10030008
685	Leaf Spring	B101253990
686	Spring Pin	B130103216
687	Ball Bearing	B210151690
688	Hexagon Nut	B070200311
689	Flange Nut	B081700611
690	Plain Washer	B100153090
696	Retaining Ring	B150300611
697	Retaining Ring	B150300711
698	Retaining Ring	B150300811
699	Retaining Ring	B150300911
700	Retaining Ring	B1050350111
701	Cup Screw	B041450311
702	Screw (CBS)	B300204211
704	Screw (CBP, 3x8)	1005019

Table A-18. Part No. Reference Table (5)

Reference No.	Description	Part Price List Name
706	Screw (CBS 2X6)	1027611
707	PE Sensor ;B	2021302
709	HP Sensor Holding Plate	1032975
715	Head Cable Guide	1031899
717	Drive Spur Gear Bushing	1033680
718	Oil Pad	1035096
719	CR Felt Leaf Spring	1035184
720	CD SW Harness	2023310
721	CR Mount Shaft	1005416
722	Top LD Guide	1026099
723	Gear 16.5	1031863
728	Black Head Adjust Lever	1030783
729	Color Head Adjust Lever	1030784
730	Black Cartridge Cover	1030788
731	Color Cartridge Cover	1030789
732	Black Cartridge Separator	1030790
733	Color Cartridge Separator	1030791
734	Compression Spring 9.9	1030787
735	Head Fasten Screw	1031163
737	Adjust Lever	1030785
738	Driven Roller Assembly C	1035601
739	Connector Switch B	2014328

A.6 Dimension and Weight

- ❑ Dimension :666 mm (W) X 554 mm (D) X 202 mm (H)
  26.2 inch (W) X 21.8 inch (D) X 7.9 inch (H)
- ❑ Weight :6.5 Kg

Figure A-12 illustrates the exterior dimension of the Stylus COLOR 1520.

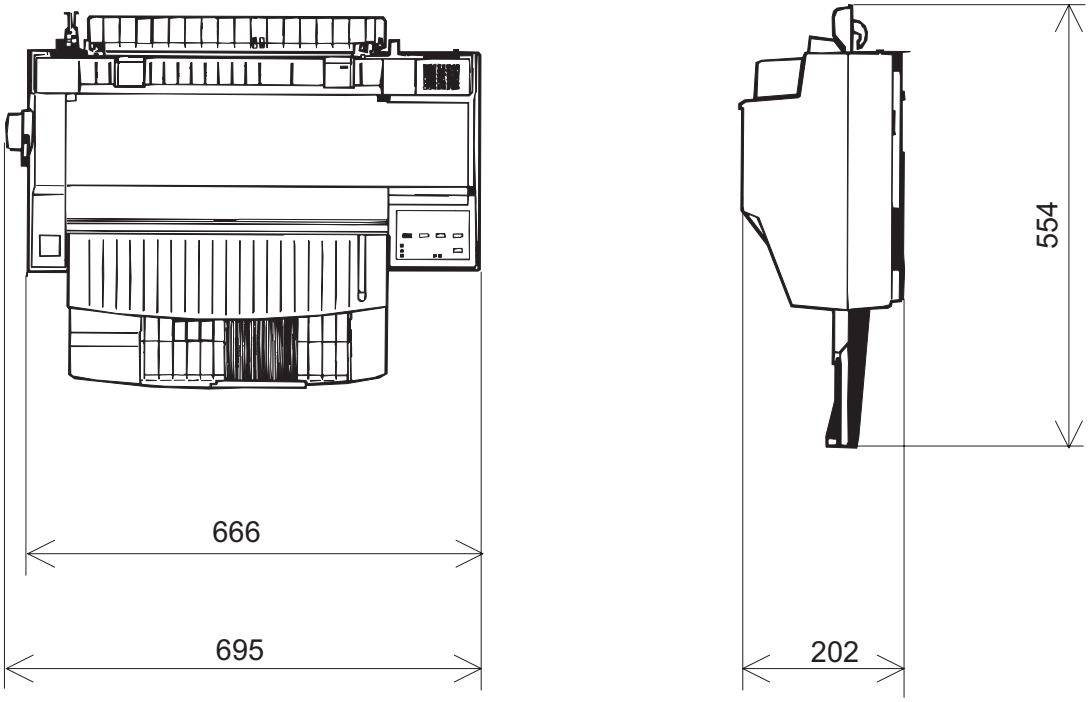


Figure A-12. Dimension of the Stylus COLOR 1520

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EPSON UK LTD. Campus 100, Maylands Avenue, Hemel Hempstead, Herts, HP2 7TJ U.K. Phone: (+44)01442-61144 Fax: (+44)01442-227227	**EPSON FRANCE S.A.** 68 bis, rue Marjolin 92300, Levallois-Perret France Phone: (1)4087-3737 Telex: 610657
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